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ABSTRACT

The College of Education of the University of Toledo designed a competency-based teacher education (CBTE) program in 1968-69 and began the implementation of that program in 1970. The total CBTE program is based upon a predetermined set of specific behaviors to be mastered, and includes a Teacher Education Center as a coordinating, materials and resource service. The initial stage of evaluation of the program involved the identification of competencies as reflected in the behavioral objectives of the instructional modules. In order to measure the demonstration of these competencies, two observation systems were used: The Teacher Performance Assessment Instrument (TPAI) and the Georgia Assessment of Teacher Effectiveness (GATE). Data were obtained from the observation of University of Toledo student teachers, student teachers from Georgia State University and Georgia College, and experienced teachers. The results were factor analyzed, and an analysis of variance was performed. The University of Toledo student teachers scored well above the midpoint on the TPAI, and their scores on the GATE were more like those of experienced teachers than student teachers from other colleges. (BW)

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RESEARCH AND EVALUATION IN TEACHER EDUCATION

A Concern for Competent, Effective Teachers

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PREFACE

The purpose of this monograph is to report initial attempts in conducting research and evaluation on an operational, competency-based, teacher education (CBTE) program. Teacher education has received increased attention during the past decade. This attention was generated by a variety of factors; some positive, some negative. As a result there has been considerable change in teacher education, much of it directed at curriculum, probably more with respect to process than content.

Teacher education has traditionally been a discipline involving little empirical investigation. The few empirical studies done tended to focus more on program content than on program products. To be sure, measurement, research and evaluation of teaching performance and effectiveness are difficult, and even now, remain in their infancy. But there is a concerted and substantial effort to extend activity in these areas and move toward a more mature level of measurement, research and evaluation.

The CBTE program at the University of Toledo has been operational for seven years. The program has gone through systematic development and implementation. The final component to be developed and implemented is the evaluation component. Involved with this component are measurement and research. The only logical view of evaluation in this context is a long-term view, that is, evaluation is an ongoing process that involves the development of new techniques along the way. This monograph contains a description of the rationale, procedures, and results of initial research into teacher competence and effectiveness from the perspective of teacher education at the University of Toledo.

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I

AN INTRODUCTION

A Concern for Competent, Effective Teachers

Don Medley has said, "Only when we know *why* a teacher is effective—as well as how—can we decide how best to train teachers."[1] Those of us affiliated with competency-based teacher education programs and those who continue with a more traditional model for preparing teachers should all recognize this present reality about teacher preparation and competence. It is one thing to develop programs to prepare, supposedly, competent teachers, but it is quite another matter to determine if the products of such programs are indeed competent professionals and effective in the probable cause-and-effect relationship between teacher behavior and pupil behavior and learning.

Teacher educators have never been much concerned about this problem because it has always been assumed that an individual experiencing a program of teacher education would be able to handle children in the classroom with some degree of professional and academic success. There has never been much of anything developed in the way of evidence to support this belief; the obvious is accepted and let go at that. But with the coming of the competency-based teacher education (CBTE) movement and general, educational accountability concerns of the 70's, there has been a considerable focus on teacher performance and competency. What teacher educators used to take for granted about successful teacher behavior and resultant pupil outcomes is no longer accepted unquestioningly. Cruickshank and Kennedy at The Ohio State University have stated that an ". . . overriding objective—to relate patterns of teaching behaviors to student outcomes—addresses one of the most crucial research problems in teacher education."[2]

A Brief Review of Research on Teacher Effectiveness

The study of teachers and teaching effectiveness has long fascinated educational researchers and evaluators. Such interest is considered to be approximately 75 years old, and it is estimated that there have been probably 150,000 studies published about pedagogical concerns and practices. Much of such research effort has been largely inconclusive as was indicated by the American Educational Research Association Committee on Teacher Effectiveness in 1953.

> . . . After 50 years of research on teacher effectiveness during which a vast number of studies have been carried out, one can point to few outcomes that a superintendent of schools can safely employ in hiring a teacher or granting him tenure, that an agency can employ in certifying teachers, or that a teacher education faculty can employ in planning or improving teacher education programs.[3]

The history of research into teacher effectiveness provides some indication of researchers' conceptions of the nature of effectiveness and why the early studies were not particularly useful and inconclusive. Teacher effectiveness was first perceived in research as a consequence of characteristics or personality traits of teachers and attempts were made to identify those characteristics. Another direction of teacher effectiveness research involved the methods of teaching being used. A third aspect of teacher effectiveness inquiry concerned the maintenance of classroom climate and conditions. More recently, teacher effectiveness research has been involved with teacher competencies and mastery of them. Consideration has been given to the ability of teachers to demonstrate teaching competencies and the possible resultant effects of such performance on pupil behavior and learning.

Early research on the characteristics or personality traits of effective teachers was best characterized in the Commonwealth Teacher-Training Study in which six major characteristics were found most important. These were good judgment, self control, considerateness, enthusiasm, magnetism, and adaptability.[4] Such studies were essentially culminated by the classic study of Ryans' for the American Council on Education titled "Characteristics of Teachers."[5] This monumental research study, published in 1960, was widely reviewed and quoted but resulted in Getzels and Jackson making the following conclusion about studies of teacher characteristics and attitudes and their relationship to teaching effectiveness:

> Despite the critical importance of the problem and a half-century of prodigious research effort, very little is known for certain about the nature and measurement of teacher personality or about the relationship between teacher personality and teaching effectiveness. The regrettable fact is that many of the studies so far have not produced significant

results. Many others have produced only inventory tabulation that good teachers are friendly, cheerful, sympathetic, and morally virtuous rather than cruel, depressed, unsympathetic, and morally depraved. But when this has been said, not very much that is especially useful has been revealed. For what conceivable human interaction—and teaching implies first and foremost a human interaction—is not the better if the people involved are friendly, cheerful, sympathetic and virtuous, rather than the opposite? What is needed is not research leading to the reiteration of the self-evident, but the discovery of specific and distinctive features of teacher personality and of the effective teacher.[5]

Teacher characteristics studies described teachers who to observers looked effective and were so judged. There was really no evidence to show that teachers possessing particular characteristics were actually more or less effective in helping pupils achieve various educational goals.

Research on so called effective methods of teaching, "methods experiments," proved to be as inconclusive or contradictory as research on teacher characteristics. Generalizations about effective teachers were difficult to make from methods experiments when the unit of analysis was not focused on the teacher but rather on the mean gains in test performance of classes taught by different teachers using different methods. No efforts were made in this research approach to determine the consistency of class results by different teachers using the same method.

In 1964 Cyphert and Spaights concluded an extensive research project that analyzed research in teacher education conducted over the prior ten-year period. They found that research in teacher education tended to focus on five main areas, namely:

(1) Present practices in teacher education,
(2) Characteristics of personality associated with various teacher behaviors,
(3) Aspects of training and experience associated with different kinds of teaching behavior or criteria of teaching success,
(4) Comparative effects of different methods of educating teachers and other educational personnel, and
(5) The emergence of the behavioral systems approach in which

> methods were developed for recording and analyzing effective teacher performance to the end that this information could serve as a decision-making base for selecting desirable teacher education content.[7]

A sound research direction in teacher effectiveness was emerging in the middle 1960's which focused on both teacher behavior and pupil learning—an effort which became known as "process-product research." Such research thinking had occurred much earlier than the 60's. Barr and his associates advocated the use of criteria of teaching effectiveness based on measured pupil gains, rather than on expert opinion, as early as 1930 but no one was listening.[8] The work of Flanders and Amidon in "Interaction Analysis" provided a process for recording teaching behavior.[9] The First Handbook of Research on Teaching[10] contained several chapters about process-product research studies. In 1971, Rosenshine's review of 50 such studies provided evidence that some aspects of teaching style were related to pupil learning.[11]

Peck and Tucker completed a ten-year review (1960-70) of research on teacher education and indicated that it was their "strong impression that a quantum leap occurred somewhere between 1963 and 1965 in the quality of both the design and reporting of research in this field."[12] Their summary of research indicated the following themes which have relevance to any consideration of teacher effectiveness:

> First it was noted that a 'systems approach' to teacher education substantially improved its effectiveness and that this approach worked equally well to induce desirable teaching behavior in cognitive and in affective respects. Much of the research in this area clustered around three special cases of systems models: training teachers in interaction and analysis, micro-teaching, and behavior modification.
>
> Second, it was found that teacher educators should practice what they preach. When teachers are taught in the same way they are supposed to treat their pupils they are more likely to adopt the desired style of teaching behavior.
>
> Third, there is the indication that direct involvement in the roles to be learned, or in such close approximations as sensitivity training laboratories or classroom simulation laboratories, produced the desired teaching behavior more

effectively than remote or abstract experiences such as lectures or instructional theory.

Fourth, it was reported that using any and all of the techniques just mentioned, it was possible to induce a more self-initiated, self-directed, effective pattern of learning, not only in teachers, but through them, in their pupils.

Fifth, the more traditional ways of educating teachers have some of the intended effects, but they also have some quite undesired effects. For example, as students move through teacher training programs and get closer to becoming teachers, they tend to become less humanistic and more custodial. The most influential content in the teacher education program in terms of impact on students' perceptions and values seems to be the nature of the supervising teachers with whom they are placed, and student teacher changes are largely in the direction of their modeling themselves after their supervising teachers. Most student teachers start out by being shocked and horrified at what their supervisors do but end up imitating them on the basis that what works justifies their actions in the classroom. There also seems no evidence that the general-liberal studies that comprise much of the teacher education program are necessary for performing as a teacher.

Sixth and finally, one long-needed methodological advance in teacher education research is beginning to appear: the use of pupil-gain measures as the ultimate criteria of the effectiveness of any given process of teacher education. These include affective and behavioral gains as well as gains in subject mastery.[13]

The publication *Teacher Competence and Teacher Effectiveness*[14] is most important in considering teacher effectiveness research. In relatively simple research terms, Medley has provided teacher educators with a useful, thoughtful compilation and integration of research on teacher effects. He has isolated the important studies and analyzed their findings. We are provided with the research results which appear consistent, and which, heretofore, have been available only in isolated reports or summaries which have not promoted total consideration of such efforts. Medley's publication

highlights the distinction between competence and effective in that the measure of teacher effectiveness (long-term pupil gain) is the indicator of teacher competence. Whether educators like it or not, the effectiveness of teachers must be considered in terms of pupil learning. Any teacher behavior that results in effective learning characterizes a "competent teacher," as this term is interpreted by the general public. All types of educators need to learn as much as possible about the relationships existing between the levels of assessment of teacher competence in teacher education (see the paradigm in Figure 1). However, teacher educators should be the most concerned for they are potentially the most vulnerable when considering the results and meaning of "process-product" research concerning teacher behaviors (process) and resulting student behavior and achievement (product).

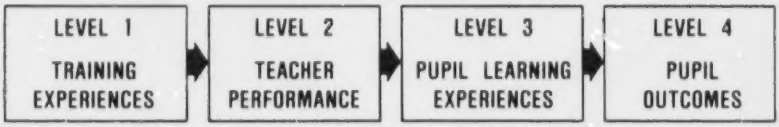

Figure 1

Assessment Levels in Teacher Education

From: Donald M. Medley, Robert S. Soar, and Ruth Soar, ASSESSMENT AND RESEARCH IN TEACHER EDUCATION: FOCUS ON PBTE. (Washington, D. C.: American Association of Colleges for Teacher Education, June, 1975). 2.

The teacher educator has been provided easy access to the meaningful, major studies of research in teacher effectiveness in *Teacher Competence and Teacher Effectiveness.* As organized, the study is straightforward and the best compilation of process/product relationships which has been done to date.* From an original list of 732 items, a weeding-out process provided 289 studies which purported to provide information on the question, "How does the behavior of effective teachers differ from that of ineffective teachers?" Four criteria were then used to determine which of the

*For example, other compilations exist in:

Gary D. Borich. THE APPRAISAL OF TEACHING: CONCEPTS AND PROCESS. (Reading, Mass.: Addison-Wesley Publishing Co., 1977). Chapters 6, 7, and 10.

Penelope L. Peterson and Herbert J. Walberg (Eds.). RESEARCH ON TEACHING. (Berkeley, Calif.: McCutchan Publishing Corp., 1979). Chapters 2, 5, 9, and 12.

289 would remain for final review. These severe but defensible criteria were:

1. The study from which a relationship came had to be designed so that the relationship was generalizable to some population of teachers larger than the sample studied.
2. The relationship had to be both reliable enough to be statistically significant and large enough to be practically significant. For a behavior to have an "important" relationship to teacher effectiveness it was artibrarily decided that the minimum overlap in the variances of the two measures involved would not be less than 15 percent which corresponds to a correlation coefficient of .39. In addition, no relationship was considered, whatever its magnitude, unless it was statistically significant at the .05 level.
3. The measure of teacher effectiveness had to be based on long-term pupil gains in achievement areas recognized as important goals of education.
4. The process measure had to specify the behaviors exhibited in such a way that they could be reproduced as desired.

The application of the criteria resulted in a thorough review of 14 studies. It was interesting to note that the procedures applied resulted in including the four major studies on teacher effectiveness (Brophy and Everston, 1974[15]; MacDonald and Elias, 1976[16]; Soar, 1973[17]; and Stallings and Kaskowitz, 1974[18] which most major researchers have agreed were the most prominent in the field. Gage, for example, had stated that these four studies ". . . may be regarded as providing a capstone of the correlational approach to meeting the need for an improved scientific basis for the art of teaching and the education of teachers."[19]

Although subscribing to the use of all of the criteria, the writers have taken some exception to the elimination in Criterion 3 of studies involving short-term learning gains, in that the elimination may have suggested that such studies should not be pursued or considered sufficiently in the future. Certainly, any studies involving student teachers and the teacher education programs which produce them, which would involve short-term gains, could be down-rated or even eliminated if this criterion were always stringently applied. As

Brophy has stated,

> "Short-term outcomes are convincing in their own right, whether or not they correlate with long-term outcomes. In fact, they provide the linkages to explain why teacher behavior influences long-term outcomes, especially test performance that is not related in any direct way to the teaching behaviors of interest. Data on long-term outcomes are needed to show that the teacher behaviors have important effects, but short-term outcomes lead us toward explanation of how the processes work and provide evidence that correlational relationships reflect casual ones. Linkages between teaching behaviors and short-term outcomes are useful even in the absence of information about long-term outcomes, and linkages between teacher behaviors and long-term outcomes are incomplete."[20]

Much space could be spent in detailed comment on the inferences/implications for teacher education programs from the Medley analysis. Any inferences made are necessarily limited by the fact that most of the studies reviewed dealt with the lower grades (1-3) and the teaching of reading or arithmetic. This limitation is understandable but points toward the necessity for more such research in other subject areas as well as at higher grade levels. Nevertheless, certain implications for teacher education programs were evident with the cautious proviso that the findings should not be over-generalized. The major results of the study are contained in Table 1.

The learning environment in an effective teacher's classroom was what might be expected--it tended to be orderly, psychologically supportive and maintained with minimum teacher effort. The ineffective teacher had the opposite type of classroom. The pupils liked school best in classrooms where they were learning the most about arithmetic and reading, and they had the highest self-esteem in such situations. There was little difference in effective patterns of teaching arithmetic and reading or for producing pupil gains on tests of high or low complexity.

An interesting finding was that apparently successful teacher behaviors for higher and lower socio-economic status (SES) pupil groups differed markedly. What turned out to be effective with one

Table I

Differences Between Effective and Ineffective Teachers of Disadvantaged Pupils in the Primary Grades Verified in Two or More Independent Studies

Teaching function	Behavior of Teachers	
	Effective	**Ineffective**
Maintenance of learning environment	Less deviant, disruptive pupil behavior Fewer teacher rebukes Less criticism Less time spent on classroom management More praise, positive motivation	More deviant, disruptive pupil behavior More teacher rebukes More criticism More time spent on classroom management Less praise, positive interaction
Use of pupil time	More class time spent in task-related "academic" activities More time spent working with large groups or whole class Less time spent working with small groups Small groups of pupils work independently less of the time Less independent seatwork	Less class time spent in task-related "academic" activities Less time spent working with large groups or whole class More time spent working with small groups Small groups of pupils work independently more of the time More dependent seatwork
Method of instruction	More "low-level" questions Fewer "high-level" questions Less likely to amplify, discuss, or use pupil answers Fewer pupil-initiated questions and comments Less feedback on pupil questions More attention to pupils when they are working independently	Fewer "low-level" questions More "high-level" questions More likely to amplify, discuss, or use pupil answers More pupil-initiated questions and comments More feedback on pupil questions Less attention to pupils when they are working independently

Source: Donald M. Medley, "The Effectiveness of Teachers," in Penelope L. Peterson and Herbert J. Walberg (Eds.) *op cit.*, p. 23.

group was proven ineffective with the other. Since many classrooms are hetrogenous in terms of pupil grouping, including SES, prospective teachers must learn more about effective grouping within the classroom and the use of appropriate teaching strategies for particular groups, in order to maximize pupil learning. The application of a general teaching methodology as provided in many teacher education courses does not prove useful. Another interesting SES inference was the matter of attention given to individual pupils. The teacher who gave the most individual attention to pupils in high SES classes became the least effective in producing cognitive gains and vice versa in low SES classes. It appeared obvious that pupils from different backgrounds demanded different teaching strategies to maximize learning opportunities.

Teachers who asked the most high-level and fewest low-level questions, had the most pupil questions, provided the most feedback to pupil questions, and who amplified or discussed pupil-initiated statements were not found to be the most effective teachers. Effective teachers asked more low-level questions, initiated fewer questions from pupils and provided them less feedback, and did not tend to expand on what pupils said.

The use of pupil time (time-on-task) is an important factor in teacher effectiveness. The ineffective teacher spent the least time on "academic" activities, had the most small-group activity, and engaged the pupils in considerable independent study. The effective teacher's classroom utilized more large-group activity, devoted more time to "academic" concerns, and had less independent seatwork. However, what seatwork was engaged in received closer supervision in the effective teacher's classroom than that which occurred in an ineffective situation. Some popular curricular and methodological conceptions of teacher educators are challenged by these findings.

The evidence that effective teachers used more praise, reinforcement, and encouragement than did ineffective teachers has implications for teacher educators. Further, the fact that effective teachers tended to be more authoritarian says something about teacher planning, lesson organization and classroom operation. The effective teacher was the better classroom manager, less permissive, more supportive, and maintained a learning environment freer from disruptive pupil behavior. A related instructive finding was the fact that effective teachers of low SES pupils in the primary grades

engaged their children in more lesson-related activities than less effective teachers did. Teacher educators can also be instructed from the evidence that teachers who produced maximum achievement gains also were likely to improve, considerably, pupils' self-concept and to develop positive attitudes toward school. The popular notion of classrooms exhibiting excessive pupil freedom and license was apparently not consistent with effective teaching as measured by long-term pupil subject matter gains.

Some of the foregoing research results have not been surprising, but some findings do challenge previously held assumptions and beliefs about effective teaching. When these results have been consistent, it requires teacher educators to incorporate them into their program development. This will require an identification of substantive results, and an analysis of how programs can best be defined in order to obtain the desired results.

The knowledge base for teacher education has been extended by recent process-product research. There are some consistent indicators of how effective teachers behave, and teacher educators should develop and incorporate the program components necessary to develop the desired behaviors. However, teacher effectiveness research is still in its infancy both methodologically and quantitatively. Therefore, it is not enough for teacher educators to simply use research results. They should conduct research, and if possible improve upon what has been done. Medley put the matter cogently when he stated:

> Teacher education, both at the preservice and the in-service level, should adopt as primary goals the development of the competencies needed to create and maintain the learning environment, to engage pupils in learning-related activities, and to implement the kind of instruction that research indicates is provided by effective teachers. There is an abundance of practical knowledge available about how to do these things; what has been missing in the past is a clear conviction on the part of teacher educators that these things are what teachers ought to be doing. Much effort has been wasted in training teachers to behave in the ways that the least effective ones do. A change of direction, so that beginning teachers will no longer need to unlearn so much, should produce a substantial, if not a dramatic, improvement

in the achievement of pupils.

The important conclusion for research in teacher effectiveness, however, is that future research should build on past findings and look for other ways to increase teacher effectiveness.[21]

CBTE—A Response to the Concern for Teacher Effectiveness

In the late 1960's and early 1970's models of teacher education programs were developed called competency or performance based teacher education (CBTE or PBTE). These had important implications for research in teacher effectiveness. The CBTE or PBTE models were grounded on the assumption that effective teachers differed from ineffective teachers in the ability of effective teachers to demonstrate a repertoire of competencies involved with the knowledge, skills, attitudes, and values of effective teaching. Such teacher education program consideration required a concern for not only how teachers behaved but why they behaved as they did. CBTE mandated a concern for research and evaluation of teacher effectiveness, something to which more traditional programs of teacher education gave lip service but minimum activity.

What is CBTE? Competency-based teacher education is a type of teacher training that focuses on a student's acquisition of specific competencies. Competencies (the knowledge, skills, attitudes and values that prospective teachers are expected to have on completion of a teacher education program) are specified as a set of learning objectives. These objectives are stated behaviorally or in a form that their achievement can be produced and observed as learner behavior and knowledge. With such objectives are established the minimum levels for their achievement, indications of the standards or "criteria" of successful attainment. The teacher competencies specified are those involved in the particular teacher skills, understandings, attitudes and behaviors that promote growth (intellectual, physical, and social) in children. Learning activities are suggested for the objectives specified which will help the student achieve the minimum level of competence. Evaluation of student performance and knowledge determines whether the criteria of successful achievement of the objective(s) occur.

Competency-based teacher education makes certain assumptions about mastery learning and student aptitude. There is acknowledgement that (1) not all students in any group learn the same amount of material in the same amount of time, (2) most students can master what is taught to them, (3) teachers have the responsibility of working with learners until they do learn, and (4) a student's aptitude for learning is not whether he can or cannot learn something but rather the amount of time that is required for the learner to master the learning task.

Competencies are generally derived from educator attempts to conceptualize the desired goals or outcomes of learning. Competencies, as translated into learning objectives, are known by students when they begin a learning experience. The students also know in advance the criteria for successful achievement of the objectives or levels of mastery desired and used. The criteria are explicit, based on the objectives, and have three forms—knowledge criteria, performance criteria and product criteria. Knowledge criteria are used to determine what one knows about teaching. Performance criteria are applied to assess one's teaching behaviors. Product criteria are used to determine one's ability to teach by examining the achievements of the pupils being taught. The emphasis is on performance and product. In CBTE, there is a great deal of difference between knowing something and doing it; teachers prepared in CBTE programs must not only give evidence of what they know but also what they can do.

The major features of CBTE are as follows: (1) a systems approach to teacher education, (2) the use of instructional modules or modularized learning experiences, (3) a concern for competency-based criteria, (4) personalized and individualized instructional strategies, (5) an emphasis on field experiences, and (6) a method of systematic evaluation of both the student and the program. Each of the above will be briefly introduced and explained.

The use of *systems theory* or systems analysis is fundamental to competency-based teacher education. This is nothing more than a process of applying scientific thinking to the development of teacher education with a heavy concentration on the *process*. The systems approach always begins with the broadest statement of the problem (system) and then uses systems analysis procedures to determine and define the system parts as functions, as well as the inter-relationship

among those functions. For example, the building of the Ohio or Toledo Model of Competency-Based Teacher Education began with the basic position that the changing demands of society, increasingly complex technologies, children with different needs, and variable economic support levels for education necessitated more deliberate planning for teacher education. The systems approach offered goal-oriented procedures to affect the deliberate planning to incorporate such thinking into the building of a new and different teacher education program.

With such a rationale in mind, a teacher education system has as its *purpose* the development of teachers who have certain knowledge, skills, and attitudes that promote childrens' learning. Its *processes* are the readings, discussions, activities, etc. that provide the necessary knowledge, skills, and attitudes. Its *components* are the instructional and managerial elements involving courses, schedules, learning modules, and time necessary to organize and operate the instructional process designed to achieve the program's purposes. The *products* of a teacher education system are the teachers who graduate from it. Success is determined by the degree to which the graduates achieve the system's objectives in terms of the specified knowledge, skills, and attitudes. Evaluation ascertains the degree to which this occurs. Information obtained from evaluation is constantly fed back (feedback) into the system to make needed changes in the program. As corrections are made the entire cycle becomes repetitive; the total process is now on-going and constantly being formed anew. Thus, a teacher education program utilizing this type of approach cannot become obsolete or static; it has the built-in potential for constant self-improvement.

An instructional *module* is a system for delivering instruction to achieve a specified learning objective or objectives. The module consists of an objective(s) in behavioral terms, a pretest to assess a student's level of achievement prior to any instructional experience, a series of instructional activities to help the student meet the objective or objectives, and a post-test to determine the student's level of mastery relative to the objective(s). Learners work on modules at their own speed, individually or in small groups. Modules focus on a single competency or a set of related competencies. When mastery has been demonstrated for a module, the student proceeds to the next module. Modules increase the possibilities for the individualization of instruction, the use of team teaching, and a wide variety of

instructional activities not always possible in more traditional college courses.

Competency-based criteria provide the minimum standards by which the student and instructor know that a competency has been met. When the competencies or learning objectives for entering the teaching profession have been clearly defined in a CBTE program, the criteria for determining whether the learning objectives have been met must be as systematically derived and explicitly stated as the objectives themselves. In any statement of such criteria there is the usual emphasis on knowledge of subject matter and general teaching or methodological concepts. However, in CBTE the primary emphasis shifts from the sole use of these criteria to an emphasis on performance criteria with accompanying assessment procedures. What a student preparing to teach *can do* becomes as important as what *he knows*. It has usually been easy to determine what a person knows about something but being concerned about what a person does based on that knowledge is taking the teaching-learning process a major step forward. And, when teacher education programs are able, finally, to relate teaching performance with what is learned by children in classrooms, another kind of competence will be better understood and required of the teacher candidate.

The *individualization* of instruction is generally understood as providing the educational opportunities for students to engage in learning activities at their own rate—sometimes independently, sometimes with others. Individualization has many instructional forms. *Personalization* of instruction, on the other hand, is the attempt to make instruction more particular to and more a concern of the individual, trying to take into account that individual's diverse interests, achievements and activities. Personalization has a meaning beyond the term individualization. It includes responses to personal feelings and the psychological needs of the learner as well as the providing of instructional opportunities. Personalization requires humaneness in that students will know exactly what they want to do and what they can do. They will have the opportunity to interact with the college faculty and school personnel in the development and achievement of learning objectives. In this way they can more easily be held accountable for demonstrating the competencies that they have participated in defining and which they have contracted to achieve. This requires a continuing personal relationship between the college faculty, the students, and other involved persons throughout

CBTE program development and operation.

Competency-based teacher education programs have a heavy emphasis on *field experiences*. Teacher competencies must be demonstrated in the real world of schools and classrooms. Every aspect of a competency-based teacher education program must have its field-based opportunity for competency demonstration and assessment. Such field experiences require close working relationships between inservice professional teachers and preservice students. Consequently, the faculty of teacher education institutions and the faculty of schools benefit from considerable interaction as they both are involved in the preparation of teachers.

Teacher education has always suffered from a lack of systematic *evaluation*. It is one thing to plan a course of training for teachers, but quite another to determine how future teachers will behave once they are responsible for their own teaching. Competency-based teacher education focuses unusual attention on evaluation. If CBTE programs are to realize their objectives, it is essential that modern technology be employed in the management and evaluation process. Evaluation in CBTE requires: (1) a clear determination of objectives, (2) careful planning of means to accomplish the objectives, and (3) on-going revision and improvement of the chosen means. A CBTE program must be so structured that it can be evaluated at any time and, if necessary, corrected at any time based on various evaluation procedures. The basic purpose of good management and evaluation is problem solving. Problems must be solved for both the program and its students. In CBTE programs solutions cannot wait for a generation of students to complete school before the solutions are implemented.

In competency-based teacher education, student assessment tends to be "criterion referenced." This type of evaluation is a trend away from comparisons of individual achievement against group performance or "curves," where a small percent receive top grades and an equally small percentage fail. In criterion referenced assessment, we are concerned about the performance of the individual, not the group mean or average, and whether this individual can meet the standard (criterion) of performance demanded for a given objective. Competence is assessed in specific situations for the specific objectives to be achieved. This achievement of situation-specific competence is the kind that occurs in real life

educational settings, with real pupils working toward real objectives. Such practices result in teachers with markedly different styles of teaching who can produce predictable educational outcomes. It is expected that assessment in a CBTE program should reflect the kind of assessment that occurs in real learning environments.

The University of Toledo CBTE Program — One Teacher Preparation Effort to Develop Teacher Effectiveness

The College of Education of The University of Toledo designed a competency-based teacher education (CBTE) program for the preparation of elementary teachers in 1968-69 and began the implementation of that program in 1970. At the same time (1970-72), a professional program for the preparation of secondary teachers in the CBTE mode was designed and its implementation begun. By 1973, the College was operating a fully developed CBTE program. This total program was a single, comprehensive effort to bring about educational changes in the way elementary and secondary teachers were prepared as well as educational changes in the schools where these teachers would likely teach. The general idea was that any effort to change teacher education should also result in change in the schools where many of our teacher education students would practice and teach. We said that a large state-supported university (like The University of Toledo) must be directly linked through its College of Education to the success or failure of the public and/or private schools with which it works and cooperates. The idea was a working partnership which would put the University and its public and private school partners to work in teacher training, for both young, new teachers as well as for more experienced teachers employed in school systems.

All of these ideas required certain things of our teacher training process. The program must be field-based (related to the real world of teaching in classrooms) to bring reality to teacher preparation. Our broad goals of education must be clear and firm so that our success in accomplishing the goals could be demonstrated; we would provide a program of teacher training which would specify the knowledge, skills, attitudes and values (competencies) needed by teachers. We would also make possible alternative means and varying lengths of time for reaching such competencies in the teacher education program. The attempt would be made to create a curriculum for teacher training in schools which would meet the

individual differences of learners through individualizing the instructional process. Everyone would have the opportunity to meet a number of common educational objectives but all would not meet them in the same way or in the same amount of time.

The teacher education program of educational change devised at The University of Toledo would be comprehensive; it would include a fully working partnership between the University and the schools it served; and it would incorporate the educational innovations of competency-based teacher education, competency-based education, and individually guided education.

Although little has been written to indicate clearly the comprehensive goals of teacher education, much has been written about the broad goals of education.[22] Recognizing the lack of comprehensive goal statements in teacher education, the Toledo CBTE program developers first adopted and then modified (for teacher education purposes) a statement on educational goals by the Committee on Quality Education for the State of Pennsylvania[23] which represented the best thinking of a distinguished group of behavioral scientists from all over the country. For our purposes they were further reviewed for teacher education goal legitimation or modification by a national blue ribbon committee of prominent educators. Ten broad goals of teacher education resulted from this effort, each beginning with the phrase, "Each teacher should be prepared to employ teacher behaviors which will help every child—

1. Acquire the greatest possible understanding of himself and appreciation of his worthiness as a member of society.
2. Acquire understanding and appreciation of persons belonging to social, cultural and ethnic groups different from his own.
3. Acquire to the fullest extent possible for him, mastery of the basic skills in the use of words and numbers.
4. Acquire a positive attitude towards school and towards the learning process.
5. Acquire the habits and attitudes associated with responsible citizenship.
6. Acquire good health habits and an understanding of the conditions necessary for the maintenance of physical and emotional well-being.

7. Acquire opportunity and encouragement to be creative in one or more fields of endeavor.

8. Understand the opportunities open to him for preparing himself for a productive life and to enable him to take full advantage of these opportunities.

9. Understand and appreciate as much as he can of human achievement in the natural sciences, the social sciences, the humanities, and the arts.

10. To prepare the world for rapid change and unforeseeable demands in which continuing education throughout his adult life should be a normal expectation."[24]

These goals were then examined in relation to five contexts which represented conditions of major importance in teacher education:

1. *Instructional Organization:* The specific content and methodologies involved in contemporary elementary schools, including individually guided education (IGE).

2. *Educational Technology:* Educational media-technology and their use by which teachers carry out instructional objectives.

3. *Contemporary Learning-Teaching Process:* Understanding the ways by which pupils best acquire knowledge and skills, the teaching techniques effective in bringing about learning, and children's developmental-learning process.

4. *Societal Factors:* The relationship of the school's and child's societies, their goals and expectations.

5. *Research:* The skills and attitudes by which teachers evaluate and revise instruction for the benefit of elementary age children, as well as research on teacher characteristics and behavior.

This examination aided the breakdown of the ten goals into various subjects and topics for behavioral objectives.

Behavioral objectives were prepared for each of the five contexts which covered the basic ten, broad goals of teacher education. The behavioral objectives, stated in terms of specific student/pupil behavior(s) which can be observed and measured, are the heart of a

CBTE program. Each lets the teacher-in-training know what is expected from him/her as demonstration of having mastered the goals of the program. Each phase of the program is built upon behavioral objectives which become the backbone of instructional modules.

Instructional modules guide both the college instructor and the college student. A module may be thought of as a short course or topic outline covering anywhere from an hour to several weeks of instruction. The composition of modules has been previously explained. At the University of Toledo, a module consists of behavioral objective(s), a rational to explain the significance of what is to be learned, suggested instructional activities, materials to be used, and evaluation procedures. As modules are identified and created, they are reviewed and sequenced in the usual course structure common to American higher education. The number of modules placed in a course depends upon the average number that can be completed by students in one quarter (ten weeks). Modules are regularly reviewed and revised by the teaching faculty. Course structure, on the other hand, tends to be more fixed, but the content of the program is constantly, gradually evolving and changing. The development of the Toledo CBTE program has been a system of successive approximations of the original ideal design.

Figure 2 presents the present model of our CBTE program. The basic professional education program is represented in the model which consists of two Career Decisions courses taken by both elementary and secondary teacher education students, four "block" courses for elementary trainees followed by Course 5, all-day, full-quarter student teaching, and two "block" courses for secondary trainees followed by Course 3, also all-day, full-quarter student teaching. All courses in the basic program are accompanied by clinical and field-based experiences with children in schools amounting to a total of 300 hours. Student teaching comprises another 300 hours of teaching experience. Students in the teacher training program also take courses in general education and their major and minor subject matter fields of study, with the entire program requiring four years of work (192 quarter hours) culminating in a Bachelor of Education degree. Only the professional education portion of the program is in the CBTE mode.

All courses in the CBTE portion of the program are the

The University of Toledo

Competency Based Teacher Education Program

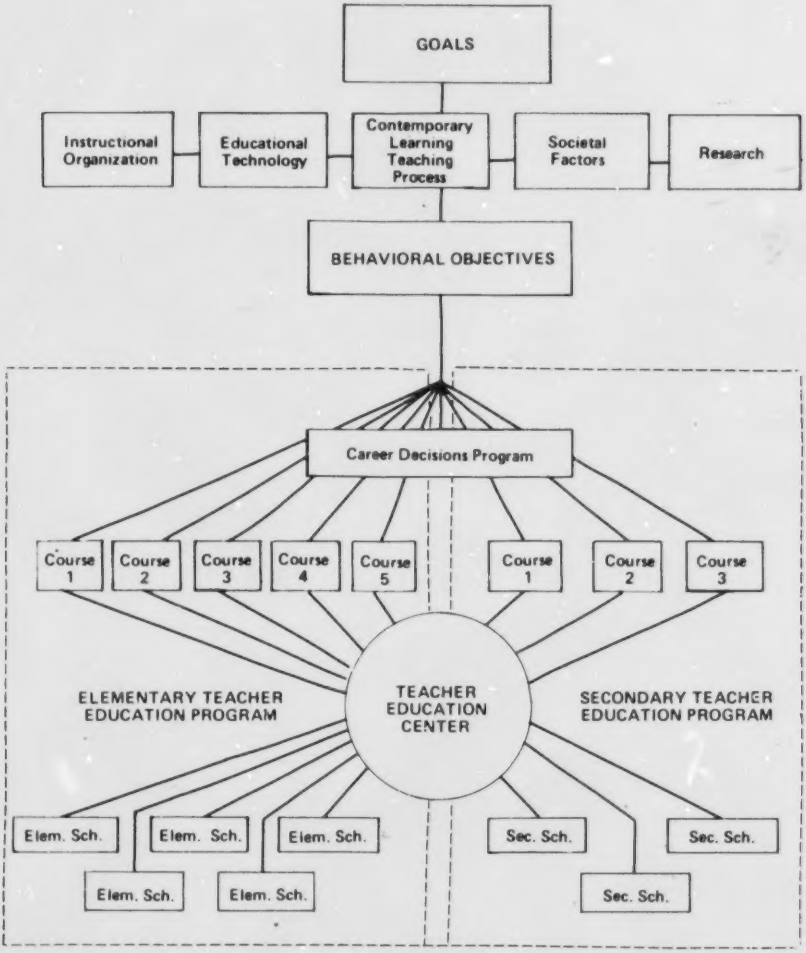

Figure 2

responsibility of teaching teams of regular faculty members who represent the disciplines of educational psychology, curriculum and methodology, educational media and technology, and social foundations of education. Each team for each course consists of four or more faculty members assisted by several graduate assistants. Certain faculty on each teaching team tend to take primary responsibility for the instruction of particular modules in each course. Each team spends several hours per week in planning sessions outside of regular class schedules. A "block" course will usually meet two and one-half to three hours per day for four days per week. This time frame also includes scheduled clinical and field-based practice in schools. Each faculty team elects a team leader who meets regularly with other team leaders and college administrators to solve day-by-day logistical and administrative problems, as well as to evaluate the effectiveness of team plans. This group is known as the Team Leaders Council. A larger coordinating committee having full representation of the Team Council, public and private school personnel, student leaders, and two members of the lay public oversees the entire program and recommends program policies. This committee of 47 persons is known as the Teacher Education Policy and Advisory Committee or TEPAC.

Career Decisions.

Entering students, freshmen or transfers, enroll during their first year in two courses which are designed to show them the world of schools and the role of the teacher from a new perspective different from their view as former elementary and secondary school students. This is accomplished by assigning them regular half-day field experiences in public, private and/or parochial classroom settings with selected teachers and schools in the Toledo metropolitan area. These field experiences are related to on-campus activities—discussions, readings, movies, and the like—in an attempt to analyze and understand the organization and purposes of schools, the roles and responsibilities of teachers at several levels, and the nature and needs of pupils in a variety of socio-economic settings. The students are urged to ask themselves the question, early and often, "Is teaching for me?" There are two courses in the career decisions sequence.

The first course is called *Career Decisions.* It is an introduction to the field of education and the College of Education's competency-based teacher education program. The student, through a variety of field experiences, small group discussions, readings and personal

assessment techniques, has an opportunity to examine his career choice. The student is required to spend one full morning or afternoon per week in an elementary and/or secondary school as an "aide."

The second course is titled *Inquiry Into Education.* In this course students actively participate in practical issues which are of concern to educators. Such issues include: understanding others through group process, achieving a positive classroom climate, understanding the special child, planning for instruction, and analyzing the structure and environment of schools. Students participate in a field experience weekly to explore course topics as well as to assess their own competencies. Successful completion of the entire career decisions sequence is a prerequisite to admission to the professional teacher education program.

Professional Course Sequence for Elementary CBTE Students.

Students successfully completing the career decisions sequence and who have chosen to enter the teaching profession then enroll for their professional course sequence at the beginning of their third year. By this time they have completed most of their general education courses (which are based upon the State of Ohio certification regulations) and are ready to complete their professional training. The four courses in the professional sequence meet four half-days each week. Each course has a particular curricular/methodological orientation (e.g., language arts, science, mathematics, social studies) as well as a focus on learning theory, child development, educational media, and societal/philosophic foundations of education. Each course further requires the student to spend approximately half of his scheduled time in a selected school setting under the supervision of a classroom teacher and a college supervisor, both of whom help the student plan and try out specific teaching activities.

Upon completing successfully the four courses which make up the professional course sequence, the student completes his/her student teaching, which is a full time assignment to a single teacher or team of teachers in an IGE school. By this time, the student has approximately 300 hours of experience working directly with a variety of schools, teachers, unit (grade) levels, and children, and is ready now to focus on an intensive learning experience in a single school with a specific unit or age group. He/she receives assistance from a number of cooperating teachers and a college supervisor whose collective responsibility is to

help the student incorporate in a full day experience all the skills and information the student has acquired throughout his college career. Weekly seminars are held with other students to identify concerns and workable solutions to problems identified by the teacher, student, or college supervisor.

The particular role of Elementary Teaching and Learning 5 includes two major functions.

1. To refine terminal performance of objectives of previous modules in the preceding courses in a continuous teaching situation.
2. To synthesize the terminal performance objectives learned in previous modules to create a continuous student teaching experience.

There are a number of specific objectives that the student must meet during this ten week experience:

1. To develop effective plans for daily activities and for long range unit programs. This incorporates the identification of important knowledge, skills and concepts with respect to specific subject matters and needs of elementary children.
2. To translate instructional goals into instructional (behavioral) objectives.
3. To develop proficiency in teaching methods including lecturing guided discussion, inquiry/discovery teaching, and questioning techniques as well as the ability to determine the effectiveness of such procedures.
4. To develop proficiency in constructing classroom tests and in test analysis appropriate to subject matter and the pupils.
5. To develop the skills of self-evaluation so that when he/she enters the profession the student will continue to grow and improve.

To aid the faculty and cooperating teachers supervising Elementary Teaching and Learning 5, checklists of criteria are developed to include criteria for skills, techniques, and knowledge in the following areas: design, implementation, evaluation, and revision. These criteria are largely the same as those that have been used in modules that have been taught prior to the student teaching experience. The use of the checklist insures that the college-based

supervisors and cooperating school teachers will follow procedures that:

1. Have a clearly stated plan from the student for each of their observations.
2. Ensure that relevant criteria will be applied to the plan objectives and strategies while observing the students carrying out the particular activies of that plan.
3. Provide the student feedback, after each observation, on how well he has met the criteria for the particular competencies observed.
4. Determine, for student teacher and observer, appropriate strategies for refining competencies in question.
5. Permit final determination of whether or not the student, on the basis of data collected, has met the criterion list used by the cooperating teacher and college supervisor.

Professional Course Sequence for Secondary CBTE Students.

Students finishing the career decisions sequence enroll in their third year in the two, basic courses required in the secondary CBTE curriculum. Students majoring in the teaching of Language Arts, Science, Social Studies, or Mathematics take only these two professional courses followed by student teaching. Students majoring in special teaching areas are required to take the first professional course and a portion of the second course, consisting of seven modules which are considered basic for all secondary undergraduates. Additional work in teaching methodology for special areas is provided through other courses. As in the elementary education professional course sequence, each of the two secondary CBTE courses requires the student to spend nearly half of his scheduled time in selected school settings under the supervision of a classroom teacher and a college supervisor.

The first course in the secondary teacher education program, called Secondary Teaching and Learning 1, covers three topics—needs assessment, goal identification and student assessment.

Techniques of gathering data about students' needs are initially developed in the career decisions course, Inquiry into Education. These skills are further developed through modules, topically

identified as *Behavior and Inferences*, in which preservice teachers are required to differentiate between pupil behavior and teacher inferences about pupil behavior. The students are also required to view classroom behaviors of pupils and make inferences about them. This process is related to the assessment of pupil needs in the classroom. Another module entitled *Observational Devices* explores ways of recording behavior, and students use these to record and interpret pupil behavior. These competencies are also utilized in a field module to apply observational, inferential and judgmental skills to assess pupils' needs in actual classroom settings.

The topic of goal identification is introduced as part of an examination of the model involving goal identification—the identification of instructional intent. In two modules entitled *Goal Analysis* and *Behavioral Objectives* students learn how to write acceptable objectives in the cognitive, affective and psycho-motor domains. In another module designated *Levels of Learning* students learn to recognize various levels of Bloom's Taxonomy and write instructional objectives for each level. Included in this module is the development of objectives for concept learning and identification and creation of principles and generalizations within each subject matter discipline.

Students in Secondary Teaching and Learning 1 have learning activities related to the area of assessment. The modules entitled *Constructing Observational Measures* and *Test Construction and Analysis* require the writing of appropriate test items for behavioral objectives at each of the levels of Bloom's Taxonomy. Interpretation of teacher made and standardized tests are also included in this module package. The module designated *Interpreting Test Results* deals with the use of testing skills at two levels. The first level is an analysis of teacher behavior in the school social system while the second is concerned with an analysis of pupil behavior in the social setting. Various social-psychological concepts are used as the basis for analysis and interpretation of behavior.

Field Performance Objectives are included in Course 1 and represent on-going application of skills in public school classrooms. These objectives provide the student with an opportunity to apply the skills learned during a sequence of class modules and expand his knowledge in areas of interest to him. Field objectives related to observing behaviors and making inferences, classifying and re-

writing teacher's objectives, analyzing teaching in terms of the instructional model, analysis of tests, and suggesting alternative instructional strategies for pupils in need of remediation require that the student begin to apply concepts and skills taught within the campus classroom.

The emphasis in Secondary Teaching and Learning 2 is the design, implementation and evaluation of actual teaching, generically, as well as in one of four teaching areas—language arts, science, social studies and mathematics. Elements of the teaching model developed in the course are instructional strategies, construction and implementation of learning units, evaluation, and revision of learning activities.

During the *Instructional Strategies* modules, the student begins to acquire skills in inquiry teaching, lecturing techniques, questioning, reception learning modes, and mediated instruction. These skills are applied in the field throughout the quarter in a concurrent field experience or in a microteaching setting. These modules are required of *all* secondary education students.

The remaining modules in course 2 are not required of students majoring in special areas but are required for the four basic teaching majors as previously indicated. Within the *Construction and Implementation* modules, the student designs instructional units, selects and produces appropriate media, and learns specific behavior management techniques. During the *Evaluation and Revision* modules, the student develops both formative and summative evaluation techniques and strategies for revision of units.

Critical to the development of competence is the completion of what is known as the "intensive unit" assignment. The prospective teacher must design a five-day unit which includes behavioral objectives, pre- and post-tests, and instructional strategies based upon the needs assessment. He then must demonstrate mastery of the behavioral objectives.

A microteaching clinic is also utilized to help the student acclimate himself to "performing" in front of secondary students and to gather firsthand data about his "controlled" teaching performance without fear of failure in terms of a grade.

The final course, Secondary Teaching and Learning 3, is student

teaching which takes on a new role in the CBTE program. Prior to student teaching, students have had much time in the field. Pre-service students have essentially been screened by potential cooperating teachers; cooperating teachers have also been observed by students. As a result, experiences in Course 3 are somewhat different from the traditional student teaching program. A major difference is the entering behavior of the student teachers. They have already field tested some basic teaching skills and identified areas of potential strength and weakness in their teaching repertoire of behaviors. Thus, they exhibit a greater degree of confidence than in the previous program and, at the same time, have set higher expectations and standards for performance. Rather than viewing this as the first real teaching experience, student teaching is now viewed as an extension of previous field service and a time for polishing and developing rather than initiation of new learning.

A second variation of this extended field experience is the utilization of specific behavioral competencies to be demonstrated by the pre service teacher within the ten-week period. This means that demonstration of specific teaching behaviors is required prior to the final evaluation of the student teacher and the taking of a first year teaching position. While a specific teaching strategy as "best" is not dictated, we do require that a variety of instructional strategies be demonstrated so that the first year teacher will be able to make choices between appropriate modes of teaching behavior. Many of these requirements are directly related to the objectives in courses 1 and 2.

Behavioral objectives with specific performance criteria have been developed around the following areas of teacher performance:

1. Structured Observation.
2. Instructional Design and Implementation, which includes
   a. instructional strategies and demonstration
   b. media selection and utilization
   c. assessment and evaluation, and
   d. individualizing instruction.
3. Teacher Role Analysis.

The Teacher Education Center.

The Teacher Education Center established in 1971, and formally

dedicated as the Velda B. Carver Teacher Education Center in the Spring of 1976, is located on the campus of The University of Toledo. The Center serves as a materials and service facility to undergraduate students in teacher education and to public and parochial school teachers in the metropolitan Toledo area.

As a center for materials resources, it houses a broad collection of curriculum materials (texts, film strips, records, pictures, kits, etc.), provides materials for teacher-produced instructional media (duplication materials, photography and ,video-tape production, dry mounting and laminating machinery, etc.), and has facilities for microteaching (use of closed circuit TV in limited teaching situations), group planning and previewing materials.

As a service facility, the resources and personnel available provide: (1) consultation and expertise on a broad range of instructional problems identified by students or by area teachers; (2) dissemination of new educational programs, materials, research, and innovations; (3) assistance for inservice education programs and program development; and (4) evaluation and testing services for students and teachers as well as for College faculty.

The Center has a full time faculty director who overseas the total operation of the Center, selects materials in consultation with faculty, and supervises staff personnel. The Center is open throughout the day and evening, five days each week, so that the materials and services are available to assist in selecting, reviewing, evaluating, locating or producing materials or to assist in the operation of equipment (e.g., projectors, videotapes, etc.).

In many ways, the Teacher Center is a unique facility serving both the College program and the area school systems. By gathering together the widest possible variety of educational materials in one center, it is the focal point for pre-service and in-service teacher instructional programs. It serves, therefore, as one of the bridges connecting the College, its undergraduate teacher education program, and the schools in the Toledo area. It serves all three groups in promoting positive educational change. By drawing together teachers, students, and faculty, problems in school programs and in the CBTE program can be reviewed and solved through a truly cooperative atmosphere. Figure 3 provides a schematic view of the Teacher Education Center and its relationships.

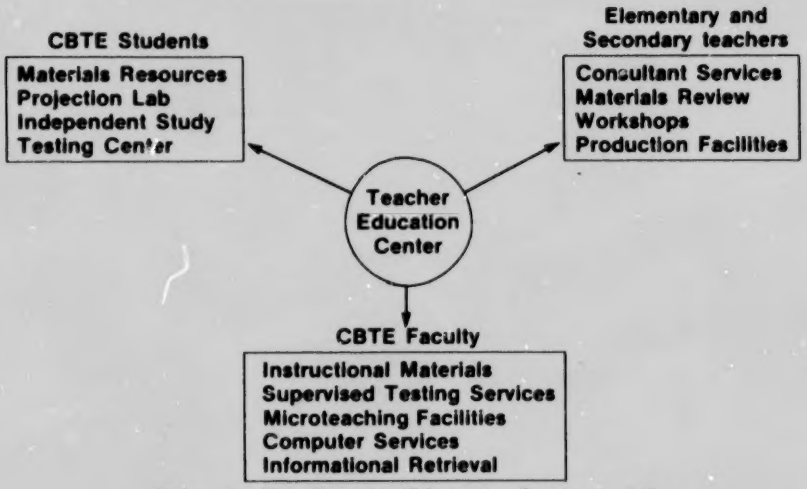

Figure 3. The Teacher Education Center and Its Relationship to CBTE Students, Inservice Teachers and College Faculty

Summary

The world of schools and the roles of teachers are and will continue to change rapidly as society changes and gains new information and insights about human behavior. Certainly colleges that prepare teachers must create programs that respond to shifting educational demands as well as help to focus change in positive, effective directions. To do so, the University CBTE program has adopted a view of program planning, evaluation, and revision that begins by considering a set of behaviors that teachers need in becoming as proficient and successful as possible.

This process system begins with broad goals of teaching in order to then identify and define the various separate but related behaviors and knowledge that are required of successful teachers in all types of schools. Once the necessary behaviors and knowledge have been designated and specified, the teacher trainers establish the most effective means for helping prospective teachers (undergraduate students) achieve the objectives at the level of performance predetermined as necessary to be successful. Because the CBTE program requires students to demonstrate their effectiveness by actually working with children in schools at every stage of the course

work, cooperative relationships with area schools are a necessary requirement.

Thus the total CBTE program, based upon a predetermined set of specific behaviors to be mastered, the Teacher Education Center serving as a coordinating, materials and resource service, and cooperating schools work together to provide the total educational system to help each student achieve the minimal proficiency required of a beginning teacher who can function in a modern school. In this way, each experience and opportunity is designed in relation to the others to support the college's responsibility to the public for training effective teachers, teachers who can begin immediately to provide worthwhile, innovative instruction for elementary and secondary school children.

The foregoing provides a brief review of where some teacher educators have been and where others are going with the long standing concern about the problem of determining and enhancing teacher effectiveness. Most teacher educators continue to have a firm conviction that a teacher does have a role in accounting for educational outcomes, but the needed evidence for this conclusion is far from complete. What still needs to be empirically established is the relationship between teacher behavior as an independent variable and student or pupil cognitive and affective outcomes as dependent variables. Teacher training programs ought to be concerned with empirical evidence linking teacher behavior to student outcomes in classroom settings. This problem has and will continue to be addressed in efforts to build a knowledge base for effective teacher education.

II

PROCEDURES FOR IDENTIFYING AND MEASURING COMPETENCIES

The University of Toledo CBTE program design and implementation, presented in Chapter I, had synthesized a considerable amount of information about society, the learning process, teacher methodology, educational technology, instructional organization and educational research. From such a base, the competencies of the program were developed and expressed in terms of the behavioral objectives found in the instructional modules making up the program. Actually, the competencies of the program were implicitly reflected in the behavioral objectives but were not clearly idenfified in early program operations. Although students going through the program were evaluated on how well the objectives were attained, the program and the students were not evaluated with respect to how well teacher competencies were developed. The program developers had concentrated on putting the program in place, adjusting to and solving program problems, and achieving a smooth-running CBTE operation. A concern for empirical student and program evaluation based on competency attainment existed, but there was never enough staff time or resources available to address this nagging, latent problem.

The University of Toledo program developers and operators knew that the basic idea of CBTE required, of the students undergoing the program, certain competencies which would enhance the educational process. Even if not strictly identified, the competencies were presumed to be "real", and were thought to be demonstrable through certain observed and measurable student behaviors. Once the necessary competencies were identified, the teacher education students in the CBTE program could be measured on the extent and proficiency of their teaching performance as that behavior reflected the competencies inherent in the program. Finally, it was hoped that further evaluation efforts could then result to link student behavior to pupil learning and outcomes.[25]

At this point it must be noted that the research literature is far from conclusive about the relationships between teacher competencies as evidenced by specific teacher behaviors and student performance or attainment. For example, Berliner has identified many impediments

to research on teacher effectiveness.[26] Other researchers have offered criticisms about the lack of consistent results from studies of teacher variables and student outcomes[27] [28] and the flawing of research procedures in process-product studies.[29] On the other hand, Gage has offered a strong defense of such research and has stated "we do have some relationships between teacher behavior and pupil achievement and attitudes on which a scientific basis for the art of teaching may be erected."[30] Medley has made a rigorous review of process-product research on teacher effectiveness and rightfully claims that ". . . no serious student of teaching can afford to be ignorant of the findings produced by research in teacher effectiveness."[31] Obviously, teacher effectiveness research in undergraduate teacher education is possible and, although complex, it must be attempted. Teacher educators do not lack the ability to acquire the knowledge and to select the instruments and techniques for making evaluative research efforts. They usually need, however, some external stimulation and resources to pursue such activities.

The stimulus for the College of Education at The University of Toledo, although it had developed a model CBTE program providing a strong concern for evaluative procedures, was the establishment of a new set of *Standards for Colleges or Universities Preparing Teachers* promulgated by the State of Ohio Department of Education.[32] The *Standards* clearly required a serious consideration of teacher and program evaluation by specifying a body of knowledge, skills, attitudes and values, which would serve as the basis for the teacher education curriculum, the teaching of this curriculum, and the providing of necessary program resources. The *Standards* mandated a well-defined plan of evaluation for the improvement of the teacher education program. The State of Ohio not only mandated the new standards but provided institutions with additional funds to achieve them. This made possible our research and evaluation effort to identify and determine how well the "knowledge, skills, attitudes, and values," to be instilled in teacher education students were being assimilated and demonstrated. The age of educational accountability in Ohio had made it legally and financially possible to evaluate teacher education programs and graduates.

Identifying Competencies in a CBTE Program

There were a number of questions which had to be raised in respect to any evaluation of the University of Toledo's CBTE program. They

were:

(1) What are the competencies which underlie the program?

(2) To what extent does the program develop these competencies?

(3) How can the competencies be measured? That is, what are the operational definitions of the competencies?

(4) How are the competencies demonstrated by student teachers in the fourth year of the program and are these competencies related to the achievement of elementary and secondary pupils?

These questions are to some extent sequential although the third may be considered a part of the second. Some answers to these questions have been obtained, as is indicated in Chapter III. However, these answers are not complete, and we are pursuing more and better answers in data collection and analysis throughout the academic years of 1979-80 and 1980-81.

The approach to identifying competencies in The University of Toledo's CBTE program was to make a thorough content analysis of the instructional modules. This analysis was conducted by three faculty members. All were thoroughly familiar with CBTE with one faculty member knowledgeable in secondary education and the other a specialist in elementary education. The third individual involved in program analysis was the director of the original project to design the CBTE program at The University of Toledo. These individuals took all of the instructional modules utilized in the basic CBTE program, including those for student teaching which involved a long series of checklists. These modules comprised the content for the ten basic courses—three at the secondary level, five at the elementary level and two courses common to both programs.

The initial procedure involved the identifying of competencies as they are reflected in the behavioral objectives of the modules. While this was occurring, another faculty team involved with a statewide study to identify the generic concepts of effective teaching as related to the *Ohio Standards* had compiled a list of 209 teacher competencies for enhancing learning. Using this list which had been derived from an analysis of the *Standards* and a review of teacher competency lists nationwide, the three Toledo CBTE program analyzers reduced the generic competency list to 96 by eliminating duplications and

combining, condensing, refining and reformulating similar competency statements. The list of 96 then was used as a checklist against the stated or implied competencies of the CBTE program. From this exercise emerged a master list of 96 stated or implied competencies from the CBTE modules. The list was arranged under the major heading of Instruction and Managing Instruction, Use of Instructional Materials, Improving the Instructional Program, Improving the Learning Environment, Being a Professional, Planning Activities Prior to Instruction, and Evaluation. The content analysis with the use of the Ohio generic competencies checklist produced an accepted body of 96 competency statements.

Observation Systems

It is one matter to develop relatively extensive and precise lists of competencies, and another matter to measure empirically the demonstration of competencies. The straightforward approach to measuring competencies is through observation; the observation of teachers in the classroom to determine the extent to which competencies are demonstrated. However, there is far from consensus as to the approaches and instruments used to measure competencies. Yet in the final analysis, it is the way measurement is conducted that operationally defines the competency.

Validity of Observation Systems.

The question of the validity of observation systems can quickly lead to a philosophical discussion centered on the question, "valid for what?" Johnson,[43] for example, implies that validity for inclusion into an instructional (teacher education) program may be different than as a requirement for acceptance into the profession. But validity of observation systems is essentially "face" or content validity; the extent to which the items, categories, indicators, whatever, of the observation instrument, reflect the competencies that have been identified. Validity essentially rests upon the correspondence between the items and the competencies, and an item has nothing to represent it except its content.

It is possible to consider the matter of construct validity after generating an adequate data base in order to perform a factor analysis. To some extent, a factor analysis may answer an after-the-fact validity

question, namely, "how many factors underlie a specified number of factors? Certainly such information is well worth obtaining. But essentially the results of a factor analysis either support or refute the developer's concept of how the competencies can be grouped. It is merely a verification (or lack there of) of such grouping, rather than supportive evidence for the inherent validity of the competencies.

Some authors would argue that the validity of competencies should be established through their relationships to student achievement. Although this idea is intuitively appealing, its operationalization is very difficult. For one thing, there are numerous extraneous factors which affect student achievement. The results in this area are far from conclusive and appear to be situation specific with numerous interactions operating.[41] So, for the present at least, validity seems to be primarily content validity.

High-Inference Observation

The Method for determining validity does not resolve the matter of how observation should take place. Although observation systems are on a continuum, they are often grouped into two categories; high-inference and low-inference. A high-inference system is one that requires the observer to make substantial inferences as to what competencies are being demonstrated and the quality of such demonstration. The behavior *itself* is not recorded. Usually an observer works from a set of indicators and descriptors for the competencies and then makes a judgment as to how well the indicators are being performed. A high-inference system requires a good deal of observer judgment about what is occurring in the classroom. In some cases, non-classroom indicators may be used for certain competencies. Usually a scaled score is generated, say from 1 to 5, on the descriptors, the scores for the descriptors of a competency summed, and then some type of mean computed to adjust for the varying numbers of descriptors.

In observing the student teachers at The University of Toledo the high-inference instrument used was the Teacher Performance Assessment Instrument (TPAI) developed at the University of Georgia. The TPAI consists of a battery of instruments, developed through a review and consensus process. Hundreds of teaching competency statements from a variety of sources were collected, sorted and synthesized. A survey instrument consisting of 52 competency

statements was administered to a stratified sample of 4,668 educators in the State of Georgia. Only competencies consistently classified as generic and essential were retained for the revised version of the instrument. The certification edition used with beginning teachers contains 22 competency statements, and the student teacher edition contains 17 statements. A copy of the TPAI as used for student teacher observation appears in the appendix.

The TPAI contains five categories of competency statements called instruments. Only four are contained in the student teacher edition and these are:

Teaching Plans and Materials (TPM)

Classroom Procedures (CP)

Interpersonal Skills (IS)

Professional Standards (PS)

The category titles are quite descriptive of the content in the competency statements. A generic teacher competency as defined by the TPAI developers is a conceptualization of a responsible and purposeful performance essential to the effective professional conduct of all teachers.[35]

High-inference observation does not necessarily require an excessive amount of observer training, although observers must be adequately trained. But judgments must be made about the quality of the performance reflecting the competencies. The scoring is highly dependent upon the inference of the observer.

Reliability Information on the TPAI.

Reliability, that is the consistency of use, is always a concern with observation systems. With the TPAI there are two concepts of reliability: (1) consistency among raters at a given point, and (2) internal consistency of ratings. Several reliability studies have been reported and they are referenced in the bibliography.[36] The results will be summarized here, and although the reliability coefficients were somewhat variable, they were generally of such magnitude to be considered adequate.

The developers of the TPAI use two definitions of interrater agreement; exact agreement and near agreement. Exact agreement requires choosing the same or identical rating for an indicator. Near agreement requires selecting either the same rating or the next most common, adjacent scale point. The interrater agreement was done by categories (or instrument) and results from several studies were reported. One study involving 72 observations, 30 teacher and 3 or 4 observations per assessment, had the following results.

Exact Agreement

TPM — Range .77 — .92 with a mean of .86

CP — Range .61 — .96 with a mean of .87

IS — Range .83 — .98 with a mean of .90

Near Agreement

TPM — Range .85 — 1.00 with a mean of .98

CP — Range .92 — 1.00 with a mean of .98

IS — Range .94 — 1.00 with a mean of .98

The study reported above, tends to have the highest reported measures of interrater agreement. In some other studies agreement occasionally dropped to around .50, but in these studies there often was high agreement as well, causing more variability among the measures. Generally, rater agreement tended to be higher when observing actual classroom interaction than when observing videotapes of classes.

As measures of internal consistency of ratings, Cronbach Alpha coefficients were calaculated. Most of these were in the low to mid .70s. They vary somewhat by the grade level and subject matter being taught.

Low-Inference Observation.

In contrast to high-inference observation, low-inference observation involves specific behaviors which are defined with sufficient precision that observers will agree on whether or not they have occurred. The process of low-inference observation is one of recording behaviors that have been observed; no more, no less. Later,

the incidence (or lack thereof) of individual behaviors are usually combined according to some type of scoring algorithm, into scores on competencies, for example. The scoring is objective, it can be done by a clerk or computer, and no inferences are required in translating the observation data into scores, once the algorithm has been defined.

The low-inference instrument used at The University of Toledo was the Georgia Assessment of Teacher Effectiveness (GATE), later modified slightly and the name changed to Classroom Observation Keyed for Effectiveness Research (COKER).

The GATE (or COKER) is an objectively administered, low-inference system for recording teacher/student interactions and transactions in the classroom. It is a composite instrument derived from five objective, systematic, direct observation instruments used in a two-year study of teaching. These are the Spaulding Teacher Activity Recording Schedule (STARS), which was formerly Spaulding Teacher Activity Rating Schedule (STARS) (Spaulding, 1970); Coping Analysis Schedule for Educational Settings (CASES) (Spaulding, 1969); Observation Schedule and Record 5V (OScAR 5V) (Medley, 1973); Florida Climate and Control System (FLACCS) (Soar, Soar & Rogosta, 1971); and Teacher Practices Observation Record (TPOR) (Brown, 1968).[37]

The COKER is a relatively comprehensive system that includes both student and teacher behavior as classroom interaction takes place, and is appropriate for elementary or secondary level classes. An observation consists of a five-minute recording period coded on a one-page (legal size) schedule. The behaviors to be observed have been selected prior to the observation.

Reliability Information on the GATE.

As with high-inference observation, observer agreement is a reliability concern in low-inference observation. In a number of observer agreement studies, average agreement tended to range from the high .70s to the low .90s for agreement between pairs of observers.[38] Another reliability concern with the GATE was the reliability of each cluster of items used in measuring a competency. (A cluster of items is called a key). Medley[39] has developed a procedure involving analysis of variance used to compute reliability for keys.

In his studies of reliability using some of the parent instruments from which the GATE was developed, Medley found varying degrees of reliability for keys. The single instrument keys tended to have reliabilities in the .60s. However, when items from different instruments were combined into composite keys, the composites were more reliable than the single-instrument keys. The median reliabilities tended to be in the high .80s; in some cases reliabilities were well above .90. Since the GATE to a large extent is a composite of other instruments, it can be inferred that the reliabilities of its keys are adequate.

Measuring Competencies

However a competency is stated, it is operationalized by the measuring instruments used to obtain information about it. Competency statements are usually broad enough so that several behaviors (either presence or absence) can be evidence for the competency. There are various approaches to competency measurement. Some of these use indicators from outside the classroom in attempts to reflect competencies which deal with general professional dedication.

Another measurement question in approaching competency measurement is the decision of whether to use low-inference or high-inference indicators. There are advantages and disadvantages to the use of each. Depending upon the critics, the same characteristic may be seen as an advantage by some and a disadvantage by others. For example, using low-inference indicators tends to lessen the subjective judgment by the observer. On the basis of consistency, this is argued as an advantage, but others see this as a disadvantage because it eliminates the qualitative dimension for measuring the competency. Either way, both low-inference and high-inference indicators undoubtedly have contributions to make to competency measurement. As indicated earlier, both types of observation were used in the data collection at Toledo.

Due to the enormity of the task of developing instruments for measuring competencies, it was decided to review existing instruments for an adequate fit to The University of Toledo competency statements. Numerous instruments were reviewed before it was decided to use the two instruments, the TPAI and the GATE. But, adopting existing instruments introduces the question, "How well do these instruments

measure the competencies that are intended from the program?" Here again, a content analysis or mapping is required of the program competencies into the behaviors (or competencies) measured by the instruments. Again, this is a major task which requires synthesis, successive approximations, the operationalizing of what may be somewhat ambiguous terms and refinement. Caution is necessary to avoid "forcing" too much into the instruments. It must be assumed that any instrument used will not measure all of the listed competencies. Many competencies will be addressed by one instrument or another, some by both, but some will be omitted entirely.

The second round of competency list analysis involving the TPAI and the GATE resulted in a final list of 49 University of Toledo teacher education program competencies under the major topics, Planning, Teaching Materials/Equipment, and Evaluation; Instructional Strategies, Techniques and/or Methods; Communication With Learners; Learner Reinforcement-Involvement; and Professional Standards. The analysis process involved the project team from The University of Toledo and the developers of both the GATE and the TPAI. The 49 competencies identified involved 85 of the 96 competency statements originally found appropriate for the UT CBTE program. Eleven were discarded. The TPAI covered 80 and the GATE 46 of the remaining 85 items. Overlapping on the TPAI-GATE occurred with 41 competencies. Converting this information into the final list of 49 competencies, the TPAI had indicators for 45 of the 49 and the GATE had indicators for 22 of the 49; overlapping between the two instruments occurred on 18 competencies. (See Table 2)

The competency refinement effort that took place essentially resulted in 49 competency statements reflecting the UT CBTE program which were more carefully considered and defined than the original list of 96. No important or appreciable loss of competencies reflected in the CBTE program occurred. And, most importantly, two measuring instruments were found which covered 49 competencies.

The TPAI has 17 broad University of Georgia competencies reflected in the student teacher version of the instrument. However, in observations, observers score the student teacher on a series of items which are classified into four broad categories. Competencies have a number of items associated with them, each competency having two or more items which are indicators of the competencies. An individual score competency is the mean rating of the items scored for that

Table 2

University of Toledo Competencies Assessed by Indicators on the TPAI and GATE Instruments and Competency Symbol Indicating Such Assessment

Competency Statement	TPAI Symbol	GATE Symbol
Topic: Planning, Teaching Materials/ Equipment and Evaluation.		
1. Plans units of instruction.	T-1	None
2. Plans instruction at a variety of cognitive levels.	T-2	None
3. Can state pupil outcomes and/or student course objectives in behavioral terms (behavioral objectives).	T-3	None
4. Has realistic expectations for the learning process and student readiness for learning.	T-4	None
5. Gathers, organizes, and evaluates pertinent information about students for effective instruction.	T-5	None
6. Identifies and evaluates learning problems of students in content area being taught.	T-6	None
7. Keeps informed of current professional/subject area literature and curricular learning materials/resources available.	T-7	None
8. Knows how to select (or construct), organize and use appropriate instructional materials and equipment to facilitate learning activities.	T-8	None
9. Uses criteria and effective procedures for determining pupil achievement of learning objectives.	T-9	None

Table 2 Cont.

	Competency Statement	TPAI Symbol	GATE Symbol
Topic:	Planning, Teaching Materials/ Equipment and Evaluation, continued.		
10.	Selects/develops appropriate assessment techniques and instruments for instructional activities.	T-10	None
11.	Collects, quantifies, and interprets data from appropriate assessment instruments.	T-11	None
12.	Maintains evaluation records.	T-12	None
13.	Engages in professional development by obtaining and analyzing evaluative information concerning the effectiveness of instruction.	T-13	None
14.	Uses information about the effectiveness of instruction to revise it, with possible curriculum modifications.	T-14	None
15.	Relates to accountability issues concerning responsibilities to students, parents, and the instructional process.	T-15	None
Topic:	Instructional Strategies, Techniques, and/or Methods.		
16.	Uses a variety of instructional strategies.	T-16	T-16
17.	Uses convergent and divergent inquiry strategies.	None	T-17
18.	Develops and demonstrates problem solving skills.	None	T-18
19.	Establishes transitions and sequences in instruction which are varied.	T-19	T-19

Table 2 Cont.

Competency Statement	TPAI Symbol	GATE Symbol
Topic: Instructional Strategies, Techniques, and/or Methods, continued.		
20. Modifies instructional activities to accomodate identified learner needs.	T-20	T-20
21. Demonstrates ability to work with individuals, small groups and large groups.	T-21	T-21
22. Structures the use of time to facilitate student learning.	T-22	T-22
23. Uses a variety of resources and materials.	T-23	T-23
24. Provides learning experiences which enable students to transfer principles and generalizations to situations outside of school.	T-24	T-24
25. Provides assignments/learning opportunities interesting and appropriate to different ability levels of pupils.	T-25	None
26. Demonstrates knowledge in the subject areas.	T-26	None
27. Demonstrates self-direction and conveys the impression of knowing what to do and how to do it.	T-27	None
28. Works effectively as a member of an instructional team.	T-28	None
29. Uses acceptable written and oral expression with learners.	T-29	None
30. Adjusts components of the physical learning environment over which the teacher has control to facilitate learning.	T-30	None

Table 2 Cont.

	Competency Statement	TPAI Symbol	GATE Symbol
Topic: Communication With Learners.			
31.	Provides group communication (cooperation, interaction, learning from others) experiences for students.	T-31	T-31
32.	Uses a variety of functional verbal and non-verbal communication skills with students.	T-32	T-32
33.	Gives clear directions and and explanations.	T-33	T-33
34.	Motivates students to ask questions.	T-34	T-34
35.	Uses questions that lead students to analyze, synthesize and think critically.	None	T-35
36.	Accepts varied student viewpoints and/or asks students to extend or elaborate answers or ideas.	T-36	T-36
37.	Demonstrates proper listening skills.	None	T-37
38.	Provides feedback to learners on their cognitive performance.	T-38	T-38
39.	Expresses a positive personal attitude toward the teaching profession.	T-39	None
Topic: Learner Reinforcement-Involvement.			
40.	Maintains an environment in which students are actively involved, working on-task.	T-40	T-40
41.	Implements an effective classroom management system for positive student behavior (discipline).	T-41	T-41
42.	Uses positive reinforcement patterns with students.	T-42	T-42

Table 2 Cont.

Competency Statement	TPAI Symbol	GATE Symbol
Topic: Learner Reinforcement-Involvement, continued		
43. Assists students in discovering and correcting errors and inaccuracies.	T-43	T-43
44. Develops student feedback, evaluation skills and student self-evaluation.	T-44	T-44
Topic: Professional Standards.		
45. Accepts responsibility, is dependable.	T-45	None
46. Evidences cooperation with others (teachers, administrators, support staff, parents, etc.) in planning and teaching.	T-46	None
47. Acts as an appropriate model in terms of ethics, attitudes and values.	T-47	None
48. Attends teacher and other professional meetings.	T-48	None
49. Understands and follows school law, policies, and procedures and their effects on teachers, and teaching, including professional conduct standards.	T-49	None

competency. Forty-five Toledo competency statements were also scored using the same items. Thus, TPAI scores were obtained on the 17 University of Georgia competencies and on the 45 Toledo competencies for which there was at least one item.

The GATE consists of a matrix of 337 cells representing various patterns of student-teacher interaction, teacher behavior, and student behavior. Cells are simply scored as the presence or absence of the behaviors or interactions. There is no scaling of the behavior observed. For scoring the observations on the GATE, the cells are mapped into the competencies indicated by them. One scoring key for the GATE uses 13 of the 15 teacher competencies originally identified by Medley and re-stated by Coker.[10] A scoring key was also developed for 22 Toledo competencies for which there was at least one item as an indicator of the competency.

Nature of the Competency Scores.

The competency scores of the TPAI are generated on a scale of 1 to 5, the greater the score the more proficient the student teacher in the competency. The scores are obtained from the scores on the items which are indicators of the competency. If an indicator is left blank it does not enter into the scoring. Scores on the scale across teachers and across competencies are somewhat relative; however, a score of one does not indicate a complete lack of competency.

The GATE observation provides check marks in cells, and these checks are converted into scores by computing an average frequency for each item by class (teacher). This permits comparing classes with different numbers of observations. Since the frequency of occurrence is greater for some items than others, contributions to a key may not be of equal weight for all items. Thus, each item is standardized to a mean of zero and standard deviation of 1.0 for the distribution across classes (teachers) so that all items contribute equal weights to the key.

A scoring key for the GATE consists of the mapping of cell scores into one or more competencies, usually several competencies. Composite key scores for each class are generated by combining the appropriate items for the key. Then the key scores are standardized across all classes with a mean of 50 and a standarad deviation of 10, respectively. Thus, the scores of two or more groups can be standaradized simultaneously and the relative positions of the group

means determined. This provides a normative interpretation of the scores, as the scores do not have absolute meaning in themselves.

Observation of Student Teachers

The data reported in this monograph were obtained from the observation of student teachers at The University of Toledo during Winter, Spring and Fall Quarter, 1979. Because of a delay in completing analyses, the Fall Quarter data for the TPAI are not included in this report. A total of 171 student teachers were observed using the GATE (or COKER) and a total of 107 using the TPAI.

A cadre of 10 teacher education pr fessors were trained to conduct the GATE observations. College supervisors of student teachers were trained to perform the TPAI observation.

Observations were conducted on an ordered basis during the student teaching experience. One faculty member was put in charge of monitoring the observation schedule and data assemblage for each instrument. A consultant from Georgia made periodic visits to check on the consistency of use of the GATE. The organization of the observation tended to keep logistical problems to a minimum.

Summary

This chapter has described the relatively long process of identifying competencies through the acquisition of data on teaching performance (of student teachers) that provide measures of those competencies. When identifying competencies, there is no problem of lack of competency statements. The literature abounds with such lists with various degrees of specificity. Rather the difficulties in identifying competencies focus on two factors: (1) obtaining a list which has content validity for the teacher education program, and (2) reducing the list to a usable number of competencies for which data can be obtained.

The identification of competencies is not an impossible task. It requires a systematic approach of successive approximations through synthesis and revision. Although subjective judgments must be made, a persistent correspondence between competencies and program content is necessary for the content validity of the competencies. In fact, at this point in the process, content validity is the only type of validity that is relevant, at least operationally relevant. At The

University of Toledo, the task of identifying the competencies involved an analysis of the entire CBTE program.

The task of measuring competencies is a formidable one, not only because of the effort involved in obtaining data, but also because of the measurement problems in this area. It is probably fair to say that measurement in this area is still in its infancy. Both high-inference and low-inference observation were used. Although there is a philosophical difference between the two approaches, they both appear to have something to offer. At least at this point the evidence is not conclusive indicating the superiority of one or the other approach.

All of this emphasis on identifying and measuring competencies is related to teacher effectiveness. The inherent assumption is that the demonstration of certain competencies enhances teacher effectiveness. Of course, research results in teacher effectiveness are far from conclusive, and the additional question is introduced, "What, in fact, comprises teacher effectiveness?" Yet, the logical connection between competencies as operationalized through teacher behavior and teacher effectiveness is strong enough to infer a relationship, at least until such time that empirical evidence either supports or refutes the relationship.

III

ANALYSIS OF OBSERVATION DATA AND RESULTS

Approaches to Analyses

The empirical data collected in this study consisted of observation "scores" on the competencies. With 49 competencies identified for The University of Toledo program, and other variables such as the Medley competencies and the 17 student teacher competencies of the TPAI, there was a large number of variables. Other groups of teachers and student teachers had been observed using the GATE, and as will be indicated later, data from these groups were useful for comparative purposes due to the nature of the GATE scores. So, with a large quantity of data, plus numerous groupings of individuals observed, a number and variety of analyses were possible. By no means have all possible analyses been exhausted. The analyses completed were those that initially seemed most informative from a research perspective.

It should be noted that some descriptive statistics were done, but inferential statistics also were used. The University of Toledo student teachers were not random samples. However, we would argue that they were representative of larger populations of student teachers, at least of populations at Toledo since the CBTE program was implemented. There was no reason to believe that any measures of central tendency or variability would have been affected in any systematic manner, and therefore, the case for the appropriateness of inferential statistics can be made.

The Use of Group Profiles

Both the TPAI and the GATE generate profiles across competencies. These can be obtained for individuals or for groups, and for purposes of this paper, group profiles are of interest. The TPAI profiles do reflect the relative performance across competencies since scaled scores are used. Comparisons can be made between competencies of a single group, or comparisons can be made with some normative group if such normative data are available.

As previously indicated, the GATE does not provide scaled scores, scores are standardized across however many groups of classes (teachers) are to be included in the analysis. (In essence, a normative

group can be used whose members include but are not limited to the members of the groups being compared.) The mean scores for each group are plotted into profiles across the competencies. In this way the relative positioning of the groups is obtained. The rationale for any normative or comparison groups is based on a logical analysis of similarities between groups or expectations of the group of primary interest.

The measure most commonly used in a profile is the mean, although other measures such as medians and proportions could also be used. A profile, then, consists of the relative positioning of the means of one or more groups for however many competencies are included in the profile. Profiles are informative in a descriptive way; they may reflect program emphases and they can also be helpful in identifying group differences.

It should be noted that profile use is not limited to groups. Profiles for individuals, especially student teachers, can be used for diagnostic purposes. In fact, in the long-term, individual profile use may be the more valuable especially for training purposes. But the needs of this study focused on research uses for which group profiles were more applicable.

Analysis of Variance By Groups.

When scores are generated for two or more groups, as was the case with the GATE data, analysis of variance (ANOVA) can be computed for each competency score to determine whether or not there are statistically significant differences between the mean scores of the groups. Of course, this does not resolve the issue of whether or not a statistically significant difference is a substantive difference. To a large extent that is a value judgment. But when looking at numerous competencies, certain patterns of differences may emerge which provide insights into consistent and potentially substantive differences between groups.

One-way analyses of variance were computed in this study. However, as the data base is expanded more complex ANOVAs may be feasible. Such ANOVAs would also provide the opportunity of checking on possible interactions among independent variables. Since the scores on the GATE are characteristically similar across competencies, it may be possible to apply repeated measures analyses,

in which competency (by number) is an independent variable. The independent variables of any higher-order ANOVAs should have a rationale for their inclusion, rather than a "shotgun" approach of including characteristics simply because the data are so coded.

Another possible analysis would be mutivariate analysis of variance (MANOVA) using the scores across competencies as the dependent variables. Group, and possibly other characteristics, could be used as independent variables. One advantage of MANOVA would be a synthesis of the competencies into canonical variates which would certainly result in some data reduction. However, MANOVA would introduce the problem of interpreting the canonical variates, which are artificial variables, a problem similar to interpreting the factors of a factor analysis.

Factor Analysis

Almost any CBTE program has a competency list with a substantial number of competencies. To limit the number of competencies to a few tends to make them too global and loses the specificity of the program. But it is quite apparent that there will be high correlations between the scores on combinations of competencies. Factor analysis is an empirical approach for synthesizing the relationships among competencies. Factor analysis also aids in identifying the number and nature of the competency "dimensions" that underly a CBTE program. Of course, this is done within the context and limitations of the identified competencies. Factor analysis can also be used to argue for the construct validity (or lack thereof) of the competencies, although with initial analyses, construct validity probably is not a major concern.

Results of Analyses

There are any number of ways that results from analyses can be organized. With large data quantities, care must be taken not to introduce confusion into the organization. For the results reported below, they will be separated by instrument, giving the results of the GATE analyses first.

After the synthesizing of the Toledo competencies, 22 were measured by the GATE. In addition, the GATE also provided scores for 13 "Medley competencies." These are actually not competency

statements but consist of process-product type of relationship statements between teacher and student. Dr. Homer Coker identified 15 significant findings from the Medley review of process-product research, cited in the bibliography. Those 15 statements are listed below. Thirteen of the statements were used in the study, Numbers 5 and 10 were omitted.

(1) When teachers work with large groups rather than small groups student gain is more likely to occur.

(2) When small groups work without adult supervision student gain is less likely to occur.

(3) Seatwork by the student is more effective when there is an appropriate balance between teacher *focusing* and structuring, and student choice of either *what*, *how*, or *when*.

(4) An increase in structured academic time is associated with greater student gain.

(5) The use of explicit cognitive teaching material for a given subject is more likely to result in student gain than the use of games and toys.

(6) When students initiate verbal interactions, gain is less likely in lower grades but more likely in intermediate and higher grades.

(7) Student correct substantive responses to teacher questions are related to greater student gain.

(8) High cognitive level questions relate negatively to student gain and low cognitive level questions relate positively to student gain, even for complex learning outcomes.

(9) When teachers amplify and discuss student responses, high socioeconomic status students tend to show greater gain than do low socioeconomic status students.

(10) Individualized instruction (teacher working with individual student) appears to be about equally negatively and positively related to student gain.

(11) Teacher hostility and rebuking behavior relates negatively to student gain.

(12) Disruptive student behavior is negatively associated with student gain.

(13) Student involvement (time-on-task) is associated positively with student gain.

(14) Non-substantive interaction between teacher and students relates negatively to student gain.

(15) Unstructured student behavior is negatively related to student gain for a given learning task; a balance between teacher structuring and student freedom provides the optimal setting for student gain.

Observations on the GATE were scored for four groups; three groups of student teachers and one group of experienced teachers. There were 171 Toledo student teachers, including those from Winter, Spring, and Fall quarters, 1979. The other three groups were as follows:

1. Student teachers from Georgia State University, an urban university in Atlanta, n = 33.
2. Student teachers from Georgia College, a college in a relatively small town, n = 23.
3. Experienced teachers from DeKalb County, Georgia, a relatively affluent county in the Atlanta area, n = 53.

The above four groups total 280 teachers or student teachers. The normative group or the group on which the scores were standardized included approximately 220 additional teachers or student teachers generating an n of over 500. This data base was obtained through West Georgia College.

The results of the GATE data collection are presented in Table 3 which provides the means and standard deviations on 22 Toledo and 13 Medley competencies for 171 University of Toledo student teachers. Means data on the GATE were also available for the other three teacher groups but these will not be presented in tabular form. The data are represented in the profile which follows.

Profile of Scores Across the Groups — GATE.

The relative positioning of the scores of the four groups was plotted for the 22 Toledo competencies in Figure 4 and the 13 Medley competencies in Figure 5. There are some interesting patterns in these

Table 3

University of Toledo (T) and Medley (M) Competency Means and Standard Deviations on GATE — n = 171

Competency Symbol	Means	Standard Deviation
Topic: Instructional Strategies Techniques and/or Methods		
T-16	51.715	10.366
T-17	51.883	10.492
T-18	51.308	9.774
T-19	49.738	9.151
T-20	49.619	10.789
T-21	50.698	13.680
T-22	49.982	9.951
T-23	51.025	11.412
T-24	52.230	10.118
Topic: Communications With Learners.		
T-31	51.893	10.461
T-32	49.770	10.891
T-33	49.356	9.070
T-34	51.590	11.751
T-35	51.703	11.875
T-36	51.978	11.586
T-37	49.467	13.516
T-38	50.722	10.479
Topic: Learner Reinforcement—Involvement.		
T-40	49.105	11.974
T-41	51.056	9.320
T-42	50.611	10.554
T-43	50.365	11.639
T-44	50.866	10.764
M-1	48.587	11.403
M-2	51.021	8.573

Table 3 Cont.

Competency Symbol	Means	Standard Deviation
Topic: Learner Reinforcement—Involvement. continued.		
M-3	50.583	9.316
M-4	49.785	10.903
M-6	51.613	10.800
M-7	51.410	9.301
M-8	51.558	11.367
M-9	52.051	12.111
M-11	50.304	11.827
M-12	50.723	10.879
M-13	51.431	10.556
M-14	48.385	10.129
M-15	48.869	11.028

Profile of Mean Competency Scores on GATE for University of Toledo, Georgia State College, Georgia College Student Teachers and DeKalb County Teachers on U. T. Competencies

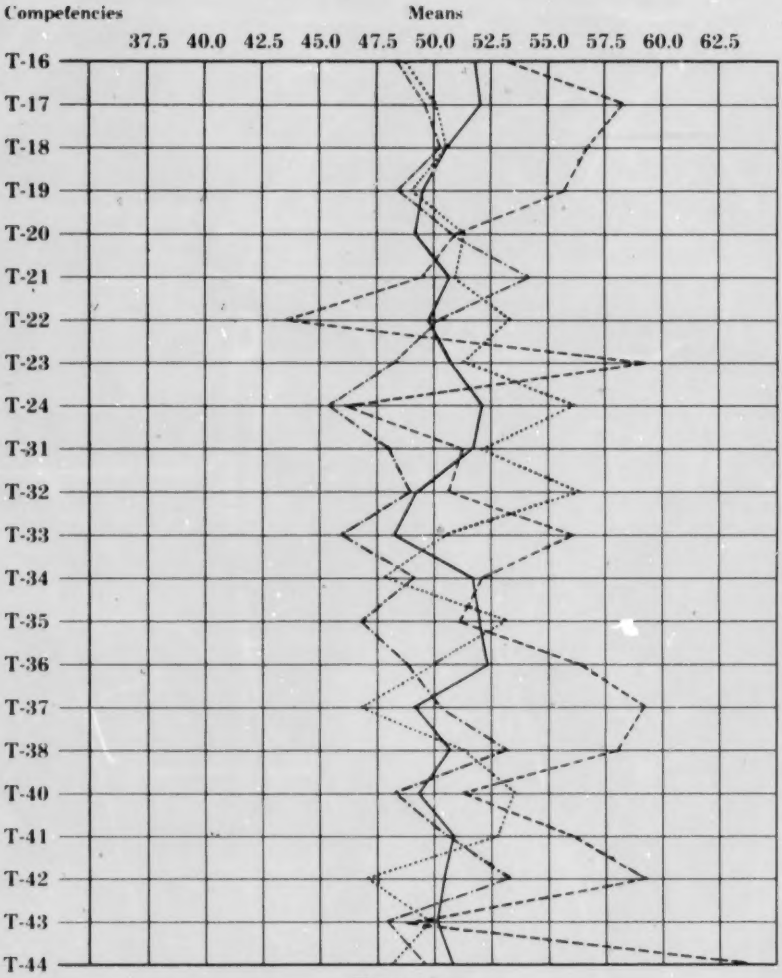

Figure 4

University of Toledo Teachers ———
Georgia State College Teachers -·-·-·-
Georgia College Teachers – – – – –
DeKalb County Teachers ·····

62

Profile of Mean Competency Scores on GATE for University of Toledo, Georgia State College, Georgia College Student Teachers and DeKalb County Teachers on Medley Competencies

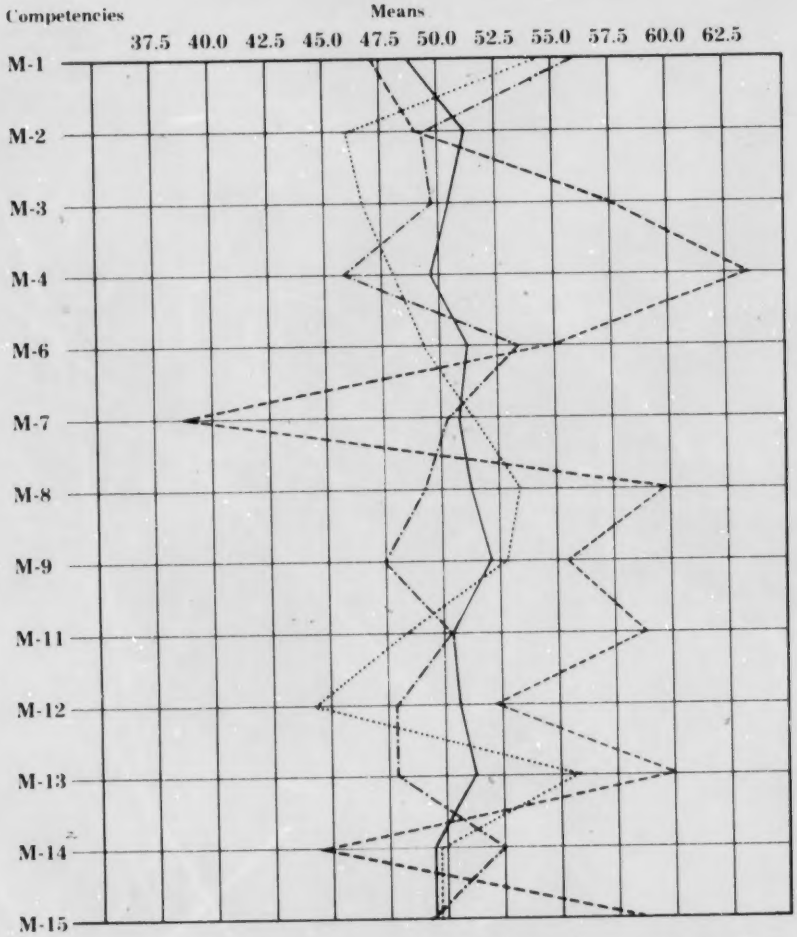

Figure 5

profiles. The Toledo student teachers show remarkable consistency across the competencies. The mean scores tend to be close to the standardized mean, and there is essentially no exception to this pattern. The Toledo student teachers were the most consistent of the four groups.

The Georgia College student teachers demonstrated the greatest variability across competencies. As can be seen in the profile, these student teachers fluctuated immensely both above and below the mean. The Georgia State student teachers had a pattern somewhat similar to that of Toledo, and overall it tended to be slightly below Toledo. The experienced teachers were considerably more variable than Toledo, with about the same number of means above and below the Toledo means.

The profiles provide a visual picture of relative positioning, but they do not provide tests for differences between groups. To test for statistically significant differences, a one-way analysis of variance was computed for each of the 35 competencies, the 22 of Toledo and the 13 of Medley. Because there was a total of 280 individuals in the four groups, these analyses had a good bit of statistical power. In fact, of the 35 competencies, the differences between the means was statistically significant for 25, at $\alpha = .05$. Another five reached significance if $\alpha = .10$ is used. Of the Medley competencies only one did not reach significance at the .10 level, and four of the Toledo competencies did not attain significance at this level.

The competencies for which there were no statistically significant differences were:

M-6. (Allowing or enhancing) students to initiate verbal interaction.

T-20. Modifies instructional activities to meet learner needs.

T-21. Works with individuals, small and large groups.

T-31. Provides group communication experiences for the student.

T-43. Assists students in discovering and correcting errors and inaccuracies.

The competencies for which there were statistically significant

differences at $\alpha = .10$ but not at .05 were:

M-9. (The teacher) amplifies and discusses student responses.

T-18. Develops and demonstrates problem solving skills.

T-34. Motivates students to ask questions.

T-35. Uses questions leading students to analyze, synthesize, and think critically.

T-36. Accepts student's views and asks students to extend answers or ideas.

For the 25 competencies with statistically significant differences between group means at $\alpha = .05$, the Toledo mean consistently positioned centrally.

The analyses of variances do indicate considerable differences between the group means. Whether statistically significant differences are substantive differences is a subjective judgment. The three student teacher groups came from different college programs. It would be difficult to infer that all the differences are due to different program effects. However, there are undoubtedly some program effects operating.

It is important to keep in mind that the scores on the competencies, and correspondingly the means, are relative and not absolute. The scoring procedure operationally placed this limitation on the scores. However, the nature of the GATE observation system precludes any other approach, since the behaviors which are indicators of the competencies are either present or absent in the observation. So, if we accept the assumption that the 53 experienced teachers of DeKalb County, as a group, represent effective teachers, their profile provides a reasonable "anchor" for comparison. The Toledo student teachers, although not quite as variable across competencies, had a profile quite similar to that of the DeKalb County teachers.

Factors Assessed by the GATE.

Thirteen of the Medley competencies and 22 of the Toledo competencies which were measured by the GATE were subjected to a principal components analysis using the SPSS computer program. The purpose of this analysis was to identify the dimensions that underlie

these competencies. Although the competencies were measured by different observable behaviors, it was expected that some of the competencies represented the same factors. The results of the analysis are found in Table 4.

Eleven factors were found which accounted for 69.8 percent of the variance among the 35 competency measures. The following is a list of the Medley (M) and Toledo (T) variables with Varimax rotated loadings above .4 for each factor. The names of the factors represent the common thread among the variables with significant loadings on each factor. Some of these names were somewhat difficult to derive, and in any case they are arbitrary.

The eleven factors focus primarily on the interaction patterns of the teacher and the students, the structure in the classroom, and other teacher activities. The synthesis of the large number of teaching competencies into these components is not particularly surprising. The factoring may be especially helpful in revising the program or at least in combining those competencies which have heretofore been considered independent.

Another result of the analysis is that it clearly identified the kinds of competencies that the GATE is able to assess. There are several dimensions of student-teacher interaction that the instrument can distinguish and each of these is an important part of teacher preparation.

Profiles of Scores — TPAI.

The TPAI data available at the time of analysis were the data from 107 student teachers, Winter and Spring quarters, 1979. Thus the data base was somewhat smaller than that for the GATE. The initial profile analysis consisted of generating profiles on the 17, student teacher, University of Georgia competencies identified by the instrument developers. The means and standard deviations for the competencies appear in Table 5. The names of the competencies are also presented in this table. Figure 6 contains the profile of means for Winter and Spring quarters.

One striking characteristic of the two profiles is their similarity. This consistency may be an indication that program effects are similar over the two groups of student teachers. On an absolute scale from 1 to

Table 4

Variables Associated with Factors — GATE

Factor I		**Structured, High Cognitive Level Discussions eigenvalue = 5.49**
.508	M3	Appropriate balance between teacher focusing and structuring and student choice of either what, how or when
.522	M4	Increase in structured academic time associated with greater student gain
—.459	M7	Student correct substantive responses to teacher questions related to greater student gain
.670		High cognitive level of questions relates negatively to student gain and vice versa
.749	M9	Amplify and discuss student responses with high S.E.S. students showing greater gain than low S.E.S. students
.438	T16	Uses variety of instructional strategies
.689	T17	Uses convergent and divergent inquiry strategies
.788	T18	Develops and demonstrates problem solving skills
—.407	T31	Provides group communications (cooperation, interaction, learning from others) experiences for students
.522	T36	Accepts varied student viewpoints and/or asks students to extend or elaborate answers or ideas.
Factor II		**Unstructured Student Behavior eigenvalue = 3.57**
.824	M11	Teacher hostility and rebuking behavior relates negatively to student gain
.718	M12	Disruptive student behavior negatively associated with student gain
.593	M15	Unstructured student behavior negatively related to student gain

Table 4 Cont.

—.527	T22	Structures the use of time to facilitate student learning
—.523	T40	Maintains an environment in which students are actively involved, working on-task
—.502	T41	Implements an effective classroom management system for positive student behavior (discipline)
.643	T42	Uses positive reinforcement patterns with students
Factor III		**Student Questioning in Small Groups eigenvalue = 3.13**
.547	M2	When small groups work without adult supervision student gain is less likely to occur
.513	M13	Student involvement (time on task) associated positively with student gain
.776	M34	Motivates students to ask questions
Factor IV		**Grouping Patterns eignvalue = 2.28**
.845	M1	When teachers work with large groups student gain more likely to occur
.842	T21	Demonstrates ability to work with individuals, small groups, or large groups
Factor V		**Evaluate Feedback eigenvalue = 2.15**
.411	M4	Increase in structured academic time associated with greater student gain
.564	M13	Student involvement (time on-task) associated positively with student gain
.554	T38	Provides feedback to learners on their cognitive performance
.723	T44	Develops student feedback, evaluation skills and student self-evaluation

Table 4 Cont.

Factor VI		**Giving Directions** **eigenvalue = 1.76**
.474	M4	Increase in structured academic time associated with greater student gain
.829	T19	Establishes transitions and sequences in instruction which are varied
.732	T33	Gives clear directions and explanations
Factor VII		**Questioning and Communication** **eigenvalue = 1.37**
.430	M15	Unstructured student behavior
.637	T32	Uses a variety of functional verbal and non-verbal communication skills with students
—.740	T35	Uses questions that lead students to analyze, synthesize and think critically
Factor VIII		**On-Task Interaction Which Transfer** **eigenvalue = 1.24**
—.647	M14	Non-substantive interaction between teacher and students relates negatively to student gain
.677	T24	Provides learning experience which enable students to transfer principles and generalization to situations outside of school
.506	T40	Maintains an environment in which students are actively involved, working on-task
Factor IX		**Student and Teacher Interaction** **eigenvalue = 1.20**
.754	M6	Students initiate verbal interaction with gain less likely in lower grades and vice versa in higher grades
.515	T36	Accepts varied student viewpoints and/or asks students to extend or elaborate answers or ideas
.778	T37	Demonstrates proper listening skills

Table 4 Cont.

Factor X		**Variety of Instructional Materials and Strategies eigenvalue = 1.12**
.477	T16	Uses a variety of instructional strategies
.704	T23	Uses a variety of resources and materials
Factor XI		**Inflexible Activities and Correcting Errors eigenvalue = 1.07**
—.605	T20	Modifies instructional activities to accomodate identified learner needs
.589	T43	Assists students in discovering and correcting errors and inaccuracies.

Table 5

Means and Standard Deviations on Seventeen Teaching Competencies — TPAI — Winter and Spring Quarters 1979

COMPETENCY		WINTER MEAN	WINTER S. D.	SPRING MEAN	SPRING S. D.
C_1	Plans instruction	3.61	.68	3.50	.73
C_2	Organizes for individuals	3.29	1.01	3.32	.96
C_3	Uses methods related to objectives	3.66	.69	3.54	.67
C_4	Communicates with learners	4.06	.59	4.04	.70
C_5	Reinforces learners	3.83	.63	3.92	.77
C_6	Uses a variety of methods	3.67	.74	3.73	.90
C_7	Involves learners	3.42	.82	3.52	.87
C_8	Understands subject matter	3.60	.67	3.53	.67
C_9	Organizes for instruction	3.85	.70	3.83	.78
C_{10}	Adjusts for conditions	3.53	.88	3.27	.90
C_{11}	Demonstrates enthusiasm	3.86	.82	3.91	1.03
C_{12}	Develops self-concepts	4.13	.72	4.12	.96
C_{13}	Manages interactions	4.24	.71	4.06	.99
C_{14}	Obtains information	3.44	.93	3.38	.75
C_{15}	Revises instruction	3.46	.98	3.43	.97
C_{16}	Meets responsibilities	4.62	.52	4.47	.54
C_{17}	Engages in self-improvement	4.28	.72	3.97	.89

5, the means tend to be high. The University of Toledo student teachers score high on competencies that involve interacting with learners and other competencies such as "Engages in self improvement," which are directed toward people. The lower mean scores on competencies tend to be associated with those competencies reflecting somewhat routine operational procedures. For example, "Organizes for individuals," had relatively low scores both quarters. "Obtaining information" was somewhat low as was "Revises instruction." The lower scores on the latter competency may be a reflection of the student teacher's reluctance to leave the planned instruction for a given lesson.

Whatever the reasons for the similarity of performance across the two quarters, it allowed combining the data without unduly affecting the variance of the scores or obscuring differences between the groups. Although the University of Georgia competencies as such were not again used in the data analysis, the scores on the same indicators were used in generating scores for 45 of the 49 Toledo competency statements.

Since the TPAI is not limited to in-class observation, as the GATE, it covers more of the Toledo competencies. For example, the TPAI obtains scores on competencies related to planning for instruction. The Toledo competencies were grouped into five major topics as follows:

1. Planning teaching materials/equipment, and evaluation.
2. Instructional strategies, techniques and/or methods.
3. Communication with learners.
4. Learner reinforcement-involvement.
5. Professional standards.

The compatencies were scored on a scale from 1 to 5 with a score around 3.0 representing a midway point in demonstrating the competency. The means and standard deviations were computed for the competencies and are presented in Table 6.

University of Toledo student teachers score consistently and significantly above the midpoint of three (3) on the 45 competencies tested. The highest scores occur on professional standards competencies (as might be expected) with the lowest scores on planning-evaluation competencies. Competencies involved with the

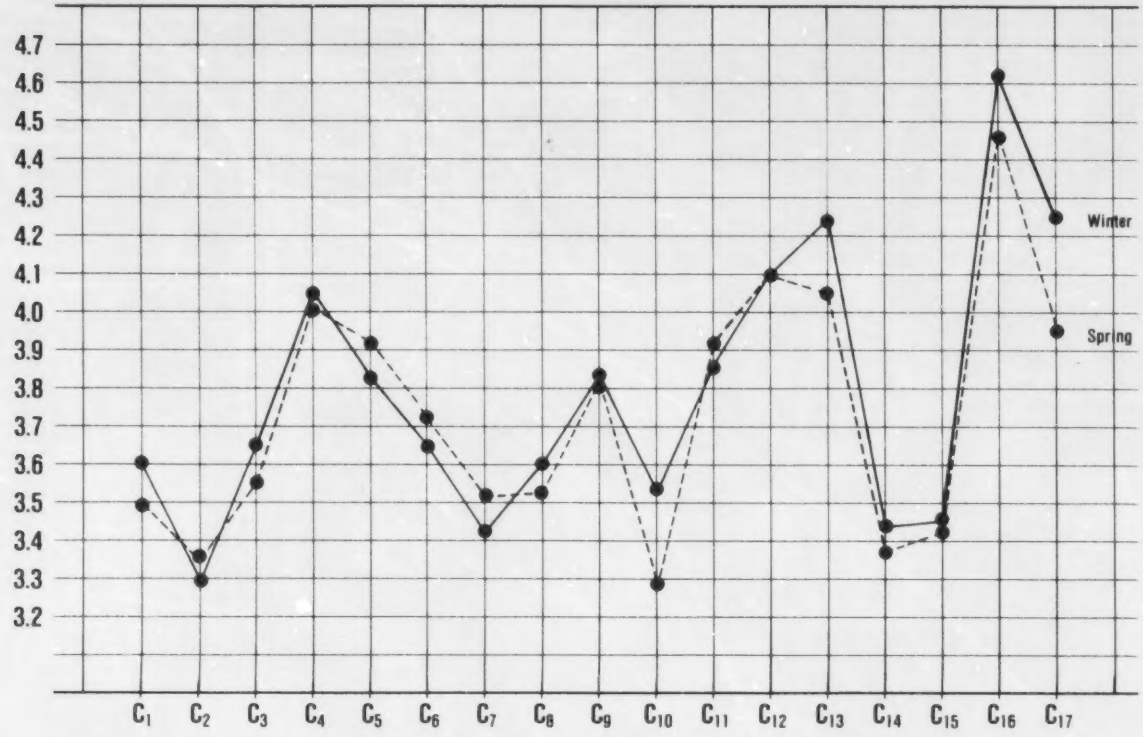

Figure 6. Profile for 17 teaching competencies using the TPAI, Winter and Spring Quarters, 1979

instructional process, communication with learners and learner involvement generally received scores well above the 3.0, 3.5 or higher.

The CBTE program at The University of Toledo stresses the use of behavioral objectives (T-3), inquiry strategies (T-17), structuring time (T-22), self-direction (T-27), working as a member of an instructional team (T-28), verbal and non-verbal communication skills (T-32), questioning (T-34) and positive discipline and reinforcement patterns (T-41 and T-42). These competencies received relatively high scores suggesting that skills and behaviors taught were being demonstrated in the classroom. However, other CBTE program aspects, such as competencies on feedback (T-44) and use of criteria and evaluation procedures (T-9, T-10, T-11, T-12, T-13 and T-14) scored slightly above the 3.0 level.

The standard deviations of the competency scores were quite consistent across competencies. Generally, they tended to be in the .7 to 1.0 range. Eleven competencies had standard deviations greater than 1.0, but they were just slightly greater than 1.0. Five of these were competencies numbered 11 through 15, competencies in the first major topic. In fact, three other competencies in that topic also had standard deviations greater than 1.0. Competencies numbered 13 and 14, which are measured by the same items had the largest standard deviation of 1.29. The final competency, number 49, had the smallest standard deviation of 0.47.

A profile was developed for the five major topics and the competencies comprising them. In this profile, the competencies are identified by number, according to the Toledo competency statement symbol. If a number is missing it means that the TPAI did not measure that competency. Figure 7 charts the competency mean scores.

Factors Assessed by the TPAI.

As with the GATE data, a factor analysis was computed on the scores of the 45 competencies measured by the TPAI. There were substantial correlations among the competency scores, which was certainly expected. Six factors were found that accounted for 83.1 percent of the variance among the competencies.

The factors had considerable redundancy in competencies if we use .4 and greater factor loadings for associating competencies with

Table 6

University of Toledo (T) Competency Means and Standard Deviations on TPAI — n = 107

Competency Symbol	Means	Standard Deviations
Topic: Planning, Teaching Materials/Equipment and Evaluation.		
T-1	3.470	0.777
T-2	3.481	1.075
T-3	3.715	0.964
T-4	3.219	1.018
T-5	3.272	0.918
T-6	3.140	0.961
T-7	3.535	0.742
T-8	3.440	0.757
T-9	3.219	1.114
T-10	3.112	0.989
T-11	3.148	1.096
T-12	3.219	1.114
T-13	3.135	1.287
T-14	3.135	1.287
T-15	3.246	1.004
Topic: Instructional Strategies, Techniques, and/or Methods.		
T-16	3.625	0.694
T-19	3.781	0.750
T-20	3.560	0.918
T-21	3.762	0.892
T-22	3.810	0.931
T-23	3.395	0.891
T-24	3.238	1.160
T-25	3.631	0.922
T-26	3.470	0.815
T-27	3.794	0.801
T-28	4.280	0.877
T-29	4.411	0.889
T-30	3.764	0.770

Table 6 Cont.

Competency Symbol	Means	Standard Deviations
Topic: Communication With Learners.		
T-31	3.731	0.946
T-32	4.037	0.758
T-33	3.684	0.781
T-34	3.808	0.876
T-36	3.808	0.876
T-38	3.313	1.065
T-39	3.801	0.877
Topic: Learners Reinforcement — Involvement.		
T-40	3.341	0.635
T-41	4.023	0.826
T-42	3.988	0.807
T-43	3.869	0.721
T-44	3.268	1.031
Topic: Professional Standards.		
T-45	4.536	0.541
T-46	4.280	0.877
T-47	4.588	0.823
T-48	4.280	0.877
T-49	4.663	0.474

factors. So it was decided to associate each competency with one factor, the factor on which it had the greatest loading. These loadings are found in Table 7.

As with any factor analysis, the names of the factors are quite arbitrary. The first factor is sort of an "all inclusive" factor, and loads heavily on numerous competencies. Other factors also have this characteristic, although they possibly are slightly more limited.

In contrast to the factors extracted from the GATE data, the factors of this analysis tended to be more general. The one exception is Factor V which loaded heavily on evaluation and feedback skills. The factors of the GATE data centered mainly on student-teacher interaction, but the factors of the TPAI data have a broader perspective including professional attitudes and planning of instruction. Of course, this result is a direct reflection of the competencies measured by the instruments.

The factor analysis is helpful in indicating the possible dimensions or constructs that underly the competencies measured. An encouraging result of both factor analyses was the emergence of several factors. This result provides some evidence for the distinction between competencies, or at least, groups of competencies, and one interpretation is that teaching is a multi-dimensional task, and that different competencies do reflect this characteristic.

Competencies Measured by Both the GATE and TPAI.

There were 18 Toledo competencies measured by both the GATE and TPAI, and the Toledo student teachers were measured on both instruments. The scores on the two measures were correlated for the student teachers and the correlation coefficients tend to be around zero magnitude. This indicates that on the same Toledo competency, the scores on one instrument are practically independent of those on the other instrument. This result is somewhat disconcerting, and there may be a number of explanations for it.

Recall initially that the GATE is a low-inference measure and the TPAI a high-inference measure. One explanation for the lack of correlation is that the score (measurement) is highly instrument dependent. Possibly because of the low-inference, high-inference contrast, the instruments are in fact measuring different, and

Profile of Mean Competency Scores on TPAI for University of Toledo Student Teachers

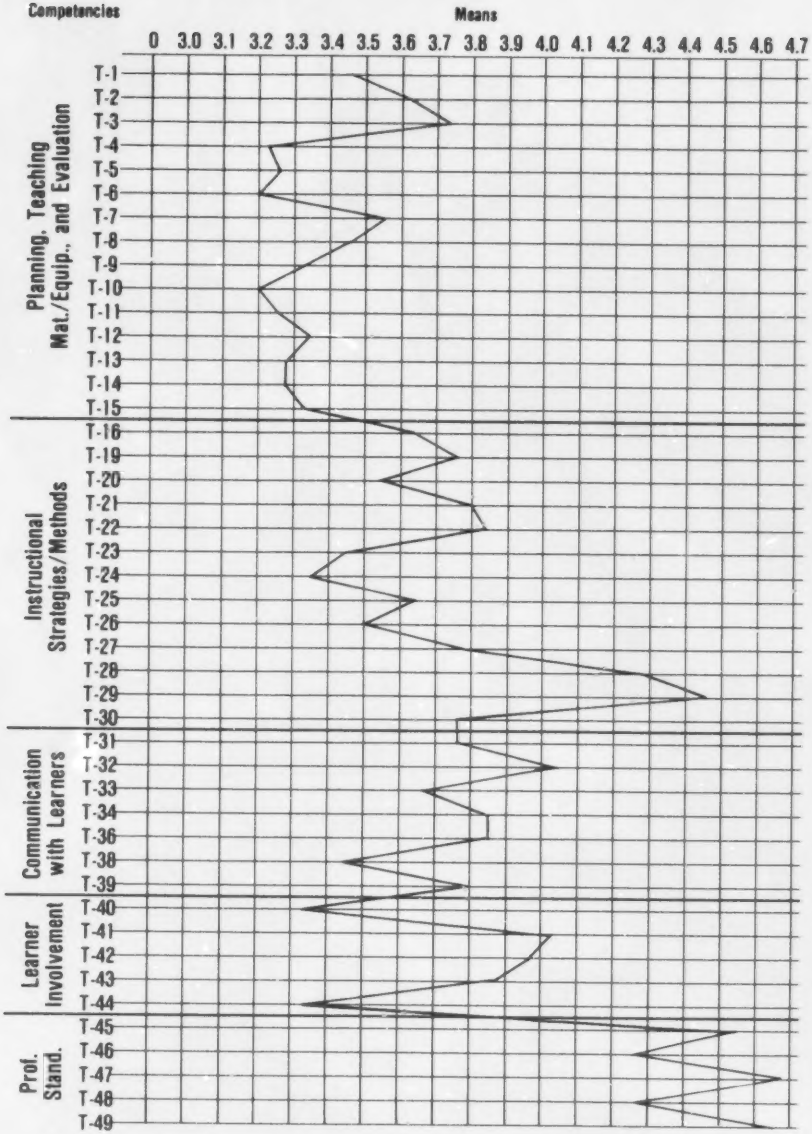
Competencies
Means
0 3.0 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4.0 4.1 4.2 4.3 4.4 4.5 4.6 4.7
Planning, Teaching Mat./Equip., and Evaluation
T-1 T-2 T-3 T-4 T-5 T-6 T-7 T-8 T-9 T-10 T-11 T-12 T-13 T-14 T-15
Instructional Strategies/Methods
T-16 T-19 T-20 T-21 T-22 T-23 T-24 T-25 T-26 T-27 T-28 T-29 T-30
Communication with Learners
T-31 T-32 T-33 T-34 T-36 T-38 T-39
Learner Involvement
T-40 T-41 T-42 T-43 T-44
Prof. Stand.
T-45 T-46 T-47 T-48 T-49

Figure 7

Table 7

Variables Associated with Factors — TPAI

Factor I		**Classroom management, presentation of content eigenvalue = 27.14**
.625	T7	Keeps informed of current professional/subject area literature and curricular learning materials/resources available.
.532	T19	Establishes transitions and sequences in instruction which are varied.
.500	T21	Demonstrates ability to work with individuals, small groups and large groups.
.775	T22	Structures the use of time to facilitate student learning.
.567	T24	Provides learning experiences which enable students to transfer principles and generalizations to situations outside of school.
.803	T26	Demonstrates knowledge in the subject areas.
.749	T27	Demonstrates self-direction and conveys the impression of knowing what to do and how to do it.
.720	T30	Adjusts components of the physical/learning environment over which the teacher has control to facilitate learning.
.563	T31	Provides group communication (cooperation, interaction, learning from others) experiences for students.
.540	T32	Uses a varaiety of functional verbal and non-verbal communication skills with students.
.687	T33	Gives clear directions and explanations.
.610	T39	Expresses a positive personal attitude toward the teaching profession.
.659	T40	Maintains an environment in which students are actively involved, working on-task.

Table 7 Cont.

.512	T41	Implements an effective classroom management system for positive student behavior (discipline).
.519	T42	Uses positive reinforcement patterns with students.
.467	T43	Assists students in discovering and correcting errors and inaccuracies.
Factor II		**Preparation, organization and implementation of teaching tasks. eigenvalue = 3.46**
.582	T4	Has realistic expectations for the learning process and student readiness for learning.
.652	T5	Gathers, organizes, and evaluates pertinent information about students for effective instruction.
.816	T6	Identifies and evaluates learning programs of students in content area being taught.
.786	T9	Uses criteria and effective procedures for determining pupil achievement of learning objectives.
.691	T10	Selects/develops appropriate assessment techniques and instruments for instructional activities.
.786	T12	Maintains evaluation records.
.461	T16	Uses a variety of instructional strategies.
.421	T25	Provides assignments/learning opportunities interesting and appropriate to different ability levels of pupils.
Factor III		**Instructional and other professional cooperation. eigenvalue = 2.90**
.922	T28	Works effectively as a member of an instructional team.
.731	T45	Accepts responsibility, is dependable.
.922	T46	Evidences cooperation with others (teachers, administrators, support staff, parents, etc.) in planning and teaching.

Table 7 Cont.

Factor III	**Instructional and other professional cooperation, (continued)**
.922 T48	Attends teacher and other professional meetings.
Factor IV	**General professional attitudes and skills. eigenvalue = 1.69**
.544 T1	Plans units of instruction.
.433 T3	Can state pupil outcomes and/or student course objectives in behavioral terms (behavioral objectives).
.514 T20	Modifies instructional activities to accomodate idenfified learner needs.
.818 T47	Acts as an appropriate model in terms of ethics, attitudes and values.
.824 T49	Understands and follows school law, policies, and procedure and their effects on teachers, and teaching, including professional conduct standards.
Factor V	**Evaluation and feedback skills. eigenvalue = 1.18**
.430 T2	Plans instruction at a variety of cognitive levels.
.644 T11	Collects, quantifies, and interprets data from appropriate assessment instruments.
.847 T13	Engages in professional development by obtaining and analyzing evaluative information concerning the effectiveness of instruction.
.847 T14	Uses information about the effectiveness of instruction to revise it, with possible curriculum modifications.
.643 T15	Relates to accountability issues concerning responsibilities to students, parents, and the instructional process.
.477 T38	Provides feedback to learners on their cognitive performance.

Table 7 Cont.

Factor V		**Evaluation and feedback skills, (continued)**
.714	T44	Develops student feedback, evaluation skills and student self-evaluation.
Factor VI		**Planning and implementing general instructional sequence. eigenvalue = 1.04**
.508	T8	Knows how to select (or construct), organize and use appropriate instructional materials and equipment to facilitate learning activities.
.479	T23	Uses a variety of resources and materials.
.700	T29	Uses acceptable written and oral expression with learners.
.786	T34	Motivates students to ask questions.
.786	T36	Accepts varied student viewpoints and/or asks students to extend or elaborate answers or ideas.

apparently, independent competencies. Of course, it is generally recognized that measurement in this area is difficult and crude. However, it is undesirable to have measurement highly instrument dependent, so that an individual's score is primarily a function of the instrument used.

The TPAI and GATE scores are different types of scores. The TPAI is scaled; the GATE is not. The GATE is a relative position type of score. Yet, it would be difficult to argue that the lack of correlation is primarily a function of the types of scores.

It is difficult to conceptualize that a competency would be manifested so differently by the instruments that the correlation between scores is zero. Possibly the mapping of the Toledo competencies into the cells of the GATE and the indicators of the TPAI "bends" the intended meaning such that any relationship that might have existed is lost. Whatever the reason, this lack of correlation phenomenon requires further study and this will be continued with future data analysis.

Summary, Conclusions and Recommendations

This study has involved a good deal of procedure and data collection. The question can be raised "What does it all mean?" There obviously remains a good deal of work to be done, but some useful results have led to the following conclusions and recommendations.

It is possible to synthesize the "content" of a teacher education program into a set of identified competencies intended to be developed by the program. This exercise, in itself, provides increased definition of the program. Although measurement is far from perfect, there are viable approaches to measuring demonstrated or underlying competencies. Adequate measurement of competencies has been a persistent problem, but we have found, with adequate confidence, existing instruments (the GATE and TPAI) which relate to The University of Toledo's program's competencies and can be used to obtain data about them. This confidence is probably enhanced more by the systematic procedures through which these instruments were developed and then applied for use with the Toledo program, than the actual results, although the results generally are useful.

The University of Toledo's student teachers scored well above the

Table 8

Correlation Coefficients Between the GATE and TPAI Scores When Measuring the Same Competency — $n = 57$.

Competency Symbol	Competency	r
T-16	Uses a variety of instructional strategies.	—.08
T-19	Establishes transitions and sequences in instruction which are varied.	.20
T-20	Modifies instructional activities to accomodate identified learner needs.	—.16
T-21	Demonstrates ability to work with individuals, small groups and large groups.	.02
T-22	Structures the use of time to facilitate student learning.	—.14
T-23	Uses a variety of resources and materials.	—.23
T-24	Provides learning experiences which enable students to transfer principals and generalizations to situations outside of school.	.08
T-31	Provides group communication (cooperation, interaction, learning from others) experiences for students.	.13
T-32	Uses a variety of functional verbal and non-verbal communication skills with students.	.19
T-33	Gives clear directions and explanations.	.03
T-34	Motivates students to ask questions.	.12
T-36	Accepts varied student viewpoints and/or asks students to extend or elaborate answers or ideas.	.08
T-38	Provides feedback to learners on their performance.	.01
T-40	Maintains an environment in which students are actively involved, working on-task.	.38

Table 8 Cont.

Competency Symbol	Competency	*r*
T-41	Implements an effective classroom management system for positive student behavior (discipline).	.08
T-42	Uses positive reinforcement patterns with students.	—.09
T-43	Assists students in discovering and correcting errors and inaccuracies.	.15
T-44	Develops student feedback, evaluation skills and student self-evaluation.	.10

midpoint on the TPAI which indicates that the competencies established for them in the program are being demonstrated in student teaching.

The University of Toledo's student teachers show remarkable consistency in their teaching performance across the competencies measured on the GATE. In the one comparison possible, their competency scores are more like those of experienced teachers than student teachers from other colleges.

The factor analyses computed on both the GATE and TPAI data support the general contention that there are some underlying traits or constructs of teaching. At least all competencies did not collapse into a single, omnibus factor.

The lack of correlation between scores on the same competency when scored on the GATE and TPAI probably reflects the difference in the measurement approaches. Arguments can and are made for the strengths of each approach; the decision about what approach to use is, at present, undoubtedly and primarily, a philosophical decision.

Information about competencies can be obtained for student teachers as a group and individually. Comparisons between individuals can be made on specific competencies or by student teacher groups on specific competencies. Profiles of comptencies of individuals can be used for diagnostic purposes, although that matter was not addressed in this monograph. The information which can be obtained about student teacher performance with respect to identified competencies can be used to identify individual competency successes and difficulties. Once a system of observation and computer analysis is established, individual profiles can be provided student teachers during their student teaching and as a cumulative means of student teaching evaluation. The evaluation of student teaching can become more objective and predictive of teacher success using the high- and low-inference measures.

The information obtained for groups of student teachers can be used for purposes of standardizing the mean scores for University of Toledo student teachers and to note the deviations from the means in terms of specific competencies. From such information, questions can be raised considering the effectiveness of the teacher education program, where the program can be improved, and likely, what needs

to be done to improve the program. Certainly, inferences about the program can be obtained from a careful study of data on student teacher competencies over an academic year and several years.

Such competency study can be extended to students as graduates in regular teaching positions. Follow-up of graduates in classrooms over a two to five year span using the instruments of the study (as refined by practice) would reveal considerably more information about teacher performance and the competencies teachers exhibit over time. The possibility would also be present for a better opportunity to relate pupil achievement and gain to teacher competency which is not possible in the student teaching situation.

Finally, the evidence from the type of research/evaluation going on at The University of Toledo will in time provide a larger knowledge base than we now have for continuing the development of a program of teacher training. The more we understand about teacher performance, the better we can develop the skills of pedogogy to improve that performance.

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(1) When teachers work with large groups rather than small groups student gain is more likely to occur.

(2) When small groups work without adult supervision student gain is less likely to occur.

(3) Seatwork by the student is more effective when there is an appropriate balance between teacher *focusing* and *structuring*, and student choice of either *what*, *how*, or *when*.

(4) An increase in structured academic time is associated with greater student gain.

(5) The use of explicit cognitive teaching material for a given subject is more likely to result in student gain than the use of games and toys.

(6) When students initiate verbal interactions, gain is less likely in lower grades but more likely in intermediate and higher grades.

(7) Student correct substantive responses to teacher questions are related to greater student gain.

(8) High cognitive level questions relate negatively to student gain and low cognitive level questions relate positively to student gain, even for complex learning outcomes.

(9) When teachers amplify and discuss student responses, high socioeconomic status students tend to show greater gain than do low socioeconomic status students.

(10) Individualized instruction (teacher working with individual student) appears to be about equally negatively and positively related to student gain,

(11) Teacher hostility and rebuking behavior relates negatively to student gain.

(12) Disruptive student behavior is negatively associated with student gain.

(13) Student involvement (time on task) is associated positively with student gain.

(14) Non-substantive interaction between teacher and students relates negatively to student gain.

(15) Unstructured student behavior is negatively related to student gain for a given learning task; a balance between teacher structuring and student freedom provides the optimal setting for student gain.

Items 5 and 10 are not used in any anslysis of GATE data; items 1-4, 6-9, and 11-15 are used in GATE analysis and are called in this paper the "Medley Competencies."

APPENDIX

1. Classroom Observations Keyes for Effectiveness Research

   Section A
   Section B

2. Teacher Performance Assessment Instruments Indicators for Competencies by Categories

   Teaching Plans and Materials
   Classroom Procedures
   Interpersonal Skills
   Professional Standarads

The Classroom Observations Keyed for Effectiveness Research Instrument

Section A

DO NOT WRITE IN THIS SPACE

Page | District | School | Teacher | Class Size

Month | Day | Year | Recorder | Grade | Subject | Visit

CLASSROOM OBSERVATIONS KEYED FOR EFFECTIVENESS RESEARCH
1979

SECTION A

		1. Passive compliance	2. Active compliance	3. Answers quest. directed to him	4. Answers quest. voluntarily	5. Substantive question	6. Procedural question	7. Volunteers comment	8. Off-Task Questions or comments	9. Individual Off-Task (V or Non V)	10. Disruptive Off-Task (V or Non V)
		01	02	03	04	05	06	07	08	09	10
PRESENTING	11. Orienting										
	12. Motivates / Prob. struct. (set induction)										
	13. Directs - learning related										
	14. Directs - non learning related										
	15. Explains, discusses, tells										
	16. Digresses										
	17. Praises										
QUESTIONING	18. Open-ended / No wrong answer										
	19. Recall / rote / information										
	20. Use or Application										
	21. Ampli / Eval / Elaborate - Students' own idea										
	22. Ampli / Eval / Elaborate - Other Students' idea										
	23. Status										
RESPONDING	24. Praises with explanation										
	25. Praises without explanation										
	26. Tells, gives info.										
	27. Wrong answer / No answer / Gives info.										
	28. Accepts - neutral / checks own perception										
	29. Uses, extends										
	30. Waits (cog)										
	31. Focusing / Cueing										
	32. Asks another student										
	33. Repeats after feedback										
	34. Listens / Observes / Pays attention										
	35. Suggests / Questions / Directs / Ignores										
	36. Interrupts / Rejects										
	37. Criticizes / Commands										
									38 / 39 Code Involvement	X	

The Classroom Observations
Keyed for Effectiveness Research Instrument

Section B

TEACHER PERFORMANCE ASSESSMENT INSTRUMENTS

Teaching Plans and Materials

Each of the items below is to be rated on a 5-point scale.

Plans Instruction to Achieve Selected Objectives.

1. Specifies or selects learner-objectives for lessons.
2. Specifies or selects teaching procedures for lessons.
3. Specifies or selects content, materials, and media for lessons.
4. Specifies or selects materials and procedures for assessing learner progress on the objectives.
5. Plans instruction at a variety of levels.

Organizes Instruction to Take Into Account Individual Differences Among Learners.

6. Organizes instruction to take into account differences among learners in their capabilities.
7. Organizes instruction to take into account differences among learners in their learning styles.
8. Organizes instruction to take into account differences among learners in their rates of learning.

Obtains and Uses Information About the Needs and Progress of Individual Learners.

9. Uses teacher-made or teacher-selected evaluation materials or procedures to obtain information about learner progress.
10. Communicates with individual learners about their needs and progress.

Refers Learners with Special Problems to Specialists.

11. Obtains and uses information about learners from cumulative records.
12. Identifies learners who require the assistance of specialists.
13. Obtains and uses information from co-workers and parents to assist with specific learner problems.

Obtains and Uses Information About the Effectiveness of Instruction to Revise It When Necessary.

14. Obtains information on the effectiveness of instruction.
15. Revises instruction as needed using evaluation results and observation data.

Classroom Procedures

Each of the items below is to be rated on a 5-point scale.

Uses Instructional Techniques, Methods, and Media Related to the Objectives.

1. Uses teaching methods appropriate for objectives, learners and environment.
2. Uses instructional equipment and other instructional aids.
3. Uses instructional materials that provide learners with appropriate practice on objectives.

Communicates with Learners.

4. Gives directions and explanations related to lesson content.
5. Clarifies directions and explanations when learners misunderstand lesson content.
6. Uses responses and questions from learners in teaching.
7. Provides feedback to learners throughout the lesson.
8. Uses acceptable written and oral expression with learners.

Demonstrates a Repertoire of Teaching Methods.

9. Implements learning activities in a logical sequence.
10. Demonstrates ability to conduct lessons using a variety of teaching methods.
11. Demonstrates ability to work with individuals, small groups, and large groups.

Reinforces and Encourages Learner Involvement in Instruction.

12. Uses procedures which get learners initially involved in lessons.
13. Provides learners with opportunities for participating.
14. Maintains learner involvement in lessons.
15. Reinforces and encourages the efforts of learners to maintain involvement.

Demonstrates an Understanding of the School Subject Being Taught.

16. Helps learners recognize the purpose and importance of topics or activities.
17. Demonstrates knowledge in the subject area.

Organizes Time, Space, Materials, and Equipment for Instruction.

18. Attends to routine tasks.
19. Uses instructional time effectively.
20. Provides a learning environment that is attractive and orderly.

Interpersonal Skills

Each of the items below is to be rated on a 5-point scale.

Demonstrates Enthusiasm for Teaching and Learning and the Subject Being Taught.

1. Communicates personal enthusiasm.
2. Stimulates learner interest.
3. Conveys the impression of knowing what to do and how to do it.

Helps Learners Develop Positive Self-concepts.

4. Demonstrates warmth and friendliness.
5. Demonstrates sensitivity to the needs and feelings of learners.
6. Demonstrates patience, empathy and understanding.

Manages Classroom Interactions.

7. Provides feedback to learners about their behavior.
8. Promotes comfortable interpersonal relationships.
9. Maintains appropriate classroom behavior.
10. Manages disruptive behavior among learners.

Professional Standards

Each of the items below is to be rated on a 5-point scale.

Meets Professional Responsibilities.

1. Works cooperatively with colleagues, administrators, and community members.
2. Follows the policies and procedures of the school district.
3. Demonstrates ethical behavior.
4. Performs extra-instructional duties.

Engages in Professional Self-Development.

5. Participates in professional growth activities.
6. Shares and seeks professional materials and ideas.